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GRADUATE CATALOG

The Graduate Catalog is the official listing of the policies governing graduate education at the University of Maryland, College Park.

This Catalog documents policies and procedures set by the Graduate Council and the Graduate School, and is updated each academic semester to reflect changes and updates to policy. Information on admissions policies, academic policies (including degree requirements), registration policies, and financial aid and student support policies are contained in the Catalog. Abstracts and information on academic degree and certificate programs, a list of graduate-level courses by program, and a roster of graduate faculty members are also included in each edition of the Catalog.

The University of Maryland, the flagship institution of the University System of Maryland, originated in 1856 as the Maryland Agricultural College and became one of the country's first land-grant institutions in 1867. The state assumed authority over the College in 1920 and formed the University of Maryland by joining the College with long-established professional schools in Baltimore. In 1988, the General Assembly of Maryland designated the College Park campus as the flagship institution for the University System of Maryland, which comprises 13 institutions across the state. The College Park campus is built around a central mall, anchored by McKeldin Library and the Main Administration Building. Fanning out from the mall are thirteen academic colleges. The University's mission is to provide graduate and undergraduate education of the highest quality, to pursue advanced research, and to serve the needs of the State of Maryland.

The University of Maryland and its surrounding area provide boundless opportunities for conducting research. The University's dynamic research environment allows students from all disciplines to undertake scholarly exploration of their special interests and to gain valuable practical experience. It also enables faculty members to advance their own areas of expertise and bring their research insights into the classroom. On campus, special facilities and a number of organized research centers, bureaus, and institutes promote the acquisition and analysis of new knowledge in the arts, sciences, and applied fields.

Steve Fetter
Dean of the Graduate School
Associate Provost for Academic Affairs

Angela Ambrosi, General Editor
May, 2018

THE GRADUATE SCHOOL

The University of Maryland Board of Regents mandates that a Graduate Faculty and a Graduate Council provide the organization by which the Graduate Faculty discharge its responsibilities for graduate education. The Graduate Council, appointed by the Dean of the Graduate School, includes faculty representatives elected by the Graduate Faculty, and graduate students. The Graduate Council recommends to the Dean, the Provost and the President policies that affect all aspects of graduate education at the University. A list of the current Graduate Council members can be found on our Graduate School website (https://gradschool.umd.edu).

The Graduate School, under the leadership of its Dean, establishes and oversees procedures to enact these policies and serves as an advocate for excellence in all aspects of graduate education.

The Graduate School, on behalf of its Dean, officially admits all students into graduate degree programs and acts as the conferring body for all graduate degrees.

In conjunction with the Graduate Council, the Graduate School:

- Administers all University policies that affect graduate education.
- Sets academic and admissions standards for graduate programs.
- Reviews applications for admission to the Graduate School for compliance with academic standards.
- Admits graduate students to all programs.
- Administers the processes for graduate students' grievances
- Admits and oversees the academic progress of non-degree seeking students.
- Reviews and approves all new graduate programs.
- Allocates annual fellowship funding to the colleges, sets minimum stipend levels, and monitors the application and academic impact of awards.
- Recommends annual minimum stipend levels for fellowships and teaching and research assistantships.
- Sets policy for and awards tuition remission as a component of University fellowship awards, external fellowships, and training grants.
- Establishes qualifications for and approves membership in the Graduate Faculty.
- Establishes qualifications necessary for graduate faculty to serve on and to chair thesis and dissertation examining committees.
- Sets policy that governs the composition of the thesis and dissertation examining committees and the conduct of the examinations.
- By appointment of a Dean's representative, oversees dissertation examinations to assure quality and uniformity of standards across academic units.
- Oversees the process of submitting approved dissertations and theses preservation of and access to the documents are the responsibilities of the University Library.
- Sets University-wide requirements for awarding graduate degrees.
- Recommends to the President that students who meet established requirements be awarded graduate degrees.
- Reviews and approves as appropriate requests for exceptions to University policies on graduate matters.
- Ensures that the University maintains official graduate student records are kept in the Office of the Registrar.
- Approves and oversees programs created by interdisciplinary Field Committees.
- Approves the programs for the Master's degree and graduate certificate in Professional Studies.
- Prepares and disseminates an annual report on graduate education.
- Administers the General Research Board, the Creative and Performing Arts Awards, the Goldhaber Travel Grants, and other programs.
- Assumes leadership in the recruitment and retention of graduate students with special emphasis on students from under-represented groups.
- Provides orientation programs, advising, and other support services that contribute to the successful matriculation, retention, and graduation of a diverse population of graduate students .
- Supports the Graduate Student Government, graduate student groups, and the Office of Graduate Student Life.

The policies and procedures that are found in this document have been approved by the Graduate Council, the Dean of the Graduate School, the Provost, and the President.

INTRODUCTION TO THE UNIVERSITY OF MARYLAND

Location of Campus and Nearby Academic Resources

Situated on 1,300 acres in the suburban town of College Park, the University is centrally located in the Baltimore-Washington corridor. This unique location, just nine miles from downtown Washington, D.C., and approximately 30 miles from both Baltimore and Annapolis, enhances research opportunities for faculty and students by providing access to some of the finest libraries and research centers in the country.

The University Libraries (https://www.lib.umd.edu/mckeldin) support the mission of the university and work to ensure students and faculty of all disciplines achieve their academic goals. Seven libraries on campus serve the diverse needs of graduate students, and a helpful team of librarians provides subject-specific expertise and support. You can find your librarian by searching https://www.lib.umd.edu/directory/specialists. Collections range in format from online books and journals to archival manuscripts, photos and recordings. Thanks to the Big Ten Academic Alliance, researchers have easy access to the 100+ million books in the combined collections of the libraries of the Big Ten.

The University's main library is Theodore R. McKeldin Library (https://www.lib.umd.edu/mckeldin). Its collections are especially strong in humanities, social sciences and the life sciences. Among its 1.2 million volumes is one of the best collections of Judaica in the region. The U.S. Congress has designated the library a federal depository for U.S. government documents and contains materials including legislative hearings, Congressional reports, federal regulations and census records, available to all Maryland residents.

Of particular interest to graduate students, the Research Commons (https://www.lib.umd.edu/rc) in McKeldin Library offers services and programs to support high-level researchers under one umbrella. Among them: the highly popular IRRoC (https://irroc.umd.edu) website, which integrates research resources on campus to help researchers compete for funding, manage projects and disseminate findings. The GIS and Geospatial Center located within the Research Commons offers computers and software to support a broad range of geographic, GIS and visualization needs. Graduate students can attend workshops, consult experts in statistics or data mining, or seek assistance from Research Commons partners such as the Graduate School Writing Center.

The Research Commons also offers a "Common Quandaries" Workshops series each semester—a sequence of workshops and panels addressing frequent concerns and questions that arise in graduate-level research. Our workshop series in the past have included topics on creating data management plans, creating a professional online presence, using citation managers, and navigating the world of publishing and conferencing.

The Terrapin Learning Commons (https://www.lib.umd.edu/tlc/home), also in McKeldin Library, accommodates collaborative work by providing group study rooms, configurable furnishings, and equipment to borrow. The John and Stella Graves MakerSpace, located within the Terrapin Learning Commons, is open to all students regardless of major and offers visitors the opportunity to experiment with new technologies including 3-D scanners and printers, virtual reality and more.

The concept of the Research Commons extends to the STEM Library (https://www.lib.umd.edu/stem), which contains not only a makerspace and GIS consulting lab, but also materials in physics, chemistry, engineering, mathematics, and geology with other significant collections in computer science, environmental sciences, water resources, and aerospace science. The STEM Library is a U.S. patent and trademark depository library.

The Architecture Library (https://www.lib.umd.edu/architecture)contains materials on architectural design, theory and history, urban design, landscape architecture, and building technology. This library's collections include architecture books dating as far back as the 17th century, with materials on world expositions from 1851 to 1937. It is open to the public M-F from 11:00 AM to 4:00 PM. All students enrolled in programs within the School of Architecture, Planning and Preservation have 24/7 swipe access with their ID cards.

The Art Library (https://www.lib.umd.edu/art)collects materials in art history, studio art, art education, photography, graphic arts, interior design, and textiles. Collections include art reproductions and art exhibition catalogs.

Part of the Clarice Smith Performing Arts Center, the Michelle Smith Performing Arts Library (https://www.lib.umd.edu/mspal)is the central location on the College Park campus for music, theatre, and dance materials. Included in the Performing Arts Library is the International Piano Archives at Maryland (IPAM), which houses one of the world's most extensive concentrations of piano recordings.

Hornbake Library (https://www.lib.umd.edu/hornbake)houses many of the University's special collections as well as the University Archives. Distinguished by their rarity or format, special collections are particularly strong in labor history, mass media and culture, the state of Maryland, literature and rare books, post-War Japan, historic preservation, and women's history. Library Media Services (https://www.lib.umd.edu/lms), located within Hornbake Library, supports access to and the creation of audio/visual media. It hosts media-centric learning and teaching spaces and multimedia production labs and studio.

Ten minutes from campus, Severn Library (https://www.lib.umd.edu/severn) is a high-density shelving facility that houses unique and semi-rare research collections. Deliveries from Severn Library arrive at McKeldin Library daily.

Home to information managers, programmers, systems analysts, and digitization experts, the University Libraries are uniquely positioned to offer technology-based solutions for specific research needs. Digital Scholarship and Publishing (https://www.lib.umd.edu/publish), for example, offers a wide range of services, tools and consultation to members of the University community to aid in the dissemination and long-term preservation of their scholarly work. The Digital Repository at UMD (DRUM) collects, preserves, and provides public access to the scholarly output of the university. Faculty and researchers can upload research products for rapid dissemination, global visibility and impact, and long-term preservation. Librarians also provide expert guidance and consultation in data management planning and data sharing and publishing.

Accreditation

The University of Maryland is accredited by the Middle States Association of Colleges and Secondary Schools and is a member of the prestigious Association of American Universities. Individual graduate programs may

be accredited by their appropriate agencies. Students should check with their graduate program of interest for particular accreditations.

Non-Discrimination Statement

The University of Maryland is committed to the elimination of discrimination on the basis of race, color, creed, sex, sexual orientation, marital status, personal appearance, age, national origin, political affiliation, physical or mental disability, or on the basis of the exercise of rights secured by the First Amendment of the United States Constitution. The Human Relations Code is established to prevent or eradicate such discrimination in accordance with due process within the University community. In doing so, the University recognizes that it must strive actively and creatively to build a community in which opportunity is equalized.

Every effort will be made to make students and potential students, employees and potential employees, faculty members and potential faculty members aware of the opportunities that the University provides for every individual to develop and utilize his or her talents and skills. It is the intent of the University to observe and promote respect for each member of the community's own race, ethnic background, sex, or sexual orientation. The Human Relations Code is accessible in its entirety online (https://www.umd.edu).

Under advice of the Maryland Attorney General's Office, the University may interpret the Code to include both gender identity and gender expression.

Disclaimer

The provisions of this publication are not to be regarded as an irrevocable contract between the student and the University of Maryland. Changes are effected from time to time in the general regulations and in the academic requirements. There are established procedures for making changes that protect the institution's integrity and the individual student's interest and welfare. A curriculum or graduation requirement, when altered, is not normally made retroactive unless the alterations are to the student's advantage and can be accommodated within the span of years normally required for graduation. When a competent authority judges the actions of a student, using established procedures, to be detrimental to the interests of the University community, that person may be required to withdraw from the university.

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Accounting, Master of Science (M.S.)

Non-thesis only: 30 credits required

Participants in the Master of Science in Accounting program gain the leading-edge knowledge and skills they need to bring exceptional value to their firms in today's high-stakes accounting arena - and earn an advanced accounting degree from one of the world's leading business schools. The curriculum is relevant, practical and applicable from day one, focusing on such key issues as: internal audit application and practice, current trends in corporate governance, the role of managerial accounting in overall management planning and control structure, fraud prevention, deterrence, detection, and control, and IT security, IT controls and IT auditing.

Course	Title	Credits
Core Requirements		
BUAC706	Business Ethics for Accountants and Auditors	2
BUAC707	Financial Statement Analysis for Accountants and Auditors	2
BUAC710	Advanced Managerial Accounting and Control Systems	2
BUAC712	Business Communications for Accountants and Auditors	2
BUAC714	Forensic Accounting/Auditing	2
BUAC723	Essentials of Negotiation	2
Electives		
Students can take electives among the following informal specializations:		18
	Internal Auditing	
	Tax	
	Public Accounting	
Total Credits		30

Accounting (BMAC)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial aid is available to qualified full-time and Executive MBA students in the form of fellowships, graduate assistantships, and scholarships.

Contact

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Fax: 301.314.9862
Email: ms_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Courses: BMGT BUAC BUDT BUFN BULM BUMK BUMO BUSI

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/ms-accounting/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Admission criteria for the MS program focusing in accounting are based on: quality of undergraduate and graduate coursework; 1 letter of recommendation; professional experience; video submission; and written essay of objectives. Prospective applicants may contact the program at 301.405.2559 for information regarding the MS program.
Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Accounting, Master of Science (M.S.) (p. 21)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Additive Manufacturing, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
Required course:		3
ENME744	Additive Manufacturing	
Select four of the following core courses:		12
ENME600	Engineering Design Methods	
ENME607	Engineering Decision Making and Risk Management	
or ENRE671	Risk Assessment in Engineering	
ENME808	Advanced Topics in Mechanical Engineering (ENME808E Applied Machine Learning for Engineering and Design)	
ENME610	Engineering Optimization	
ENPM671	Advanced Mechanics of Materials	
Select five of the following pre-approved technical electives:		15
ENME627		
ENME647	Multiphase Flow and Heat Transfer	
ENME672	Composite Materials	
ENME770	Life Cycle Cost and System Sustainment Analysis	
ENPM641	Systems Concepts, Issues, and Processes	
ENPM808	Advanced Topics in Engineering (ENPM808G Additive Manufacturing for Aerospace, Energy and Water Applications)	
ENPM808	Advanced Topics in Engineering (ENPM808E Applied Topology Optimization)	
ENPM809	Special Topics in Engineering (ENPM809C Applied Statistics)	
Total Credits		30

Additive Manufacturing (PMAM)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our graduate programs in Additive Manufacturing give students unique access to hands-on training in various methods of design, production systems, and fabrication from world-class experts. Students will also benefit from university resources like the Makerbot Innovation Center, a 3D printing space available to all UMD students.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

FINANCIAL ASSISTANCE

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully

covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/additive-manufacturing.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Additive Manufacturing, Master of Engineering (M.Eng.) (p. 22)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.
The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Additive Manufacturing, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required course:		3
ENME744	Additive Manufacturing	
Select four of the following:		9
ENME600	Engineering Design Methods	
ENME607	Engineering Decision Making and Risk Management	
or ENRE671	Risk Assessment in Engineering	
ENME610	Engineering Optimization	
ENME743	Applied Machine Learning for Engineering and Design	
ENPM671	Advanced Mechanics of Materials	
Total Credits		12

Additive Manufacturing (Z115)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our graduate programs in Additive Manufacturing give students unique access to hands-on training in various methods of design, production systems, and fabrication from world-class experts. Students will also benefit from university resources like the Makerbot Innovation Center, a 3D printing space available to all UMD students.

FINANCIAL ASSISTANCE

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/additive-manufacturing.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required.
For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Additive Manufacturing, Post-Baccalaureate Certificate (P.B.C.) (p. 23)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County.
In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.
The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students

full access to licensed software, libraries, databases, and specialized programs.

Administration, Supervision & Curriculum, Certificate of Advanced Study (C.A.S.)

This certificate is not currently accepting applications.

Administration, Supervision & Curriculum (Z900)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Contact

College of Education
Benjamin Building
3942 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2359

Website: http://www.education.umd.edu
Courses: AASP

Admissions

Admissions Information

This program is not currently accepting applications. Please see www.education.umd.edu for information on other certificates.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not accepting applications for Fall 2018
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Not accepting applications for Fall 2018

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Administration, Supervision & Curriculum, Certificate of Advanced Study (C.A.S.) (p. 25)

Aerospace Engineering, Master of Science (M.S.)

Thesis option: 30 credits

Non-thesis option: 30 credits

At least 12 of the 30 credits are to be in the main discipline. No more than 9 credits may be at the 400 level of which no more than 6 credits may be from department courses. For the thesis option, 6 credits of ENAE799 are required as well as the successful defense of the M.S. thesis. For the non-thesis option, students must write a scholarly paper.

Course	Title	Credits
Core requirement		
Select 24 credits of coursework [1]		24
Thesis or Non-thesis option		6
Thesis:		
ENAE799	Master's Thesis Research	
Non-thesis:		
Six additional credits of coursework		
Scholarly paper is required		
Specialization Options		
Aerodynamics and Propulsion		
Structural Mechanics and Composites		
Rotocraft		
Space Systems		
Flight Dynamics, Stability and Control		
Total Credits		30

[1] Minimum of 12 credits (four courses) in main study discipline (600 level or above). Maximum of nine credits (3 courses) at the 400 level, of which not more than six credits may be department courses.

Aerospace Engineering, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 36 credits beyond the Bachelor's degree, in addition to 12 credits of ENAE899. Required coursework should include not less than 18 hours within one departmental area of specialization, at least 6 hours from among the other areas of specialization in the Department, and not less than 9 hours in courses that emphasize the physical sciences or mathematics.

At least 12 semester hours of credits taken to satisfy (2) and (3) must be 600 level or higher. The student must pass a written qualifying and an oral comprehensive examination and take 12 hours of dissertation credits.

Course	Title	Credits
Major Area Requirement		
Select a minimum of 18 credits within one of the following departmental core area of specializations:		18
Aerodynamics and Propulsion		
Flight Dynamics Stability and Control		
Rotocraft		
Space Systems		
Structural Mechanics and Composites		
Minor Area Requirement		
Select minimum of 6 credits are required within one of the other departmental core areas of specialization, or from another department		6

Math/Science Requirement		
Select a minimum of nine credits of coursework must emphasize mathematics, physical sciences, life sciences, or computer sciences [1]		9

Dissertation Research Requirements		
ENAE899	Doctoral Dissertation Research	12

[1] No more than 3 credits can be from the College of Engineering. The one engineering course that can count toward this requirement must not be a course that could apply to either the major or minor concentration area. At least 3 credits must be at the 600 level or higher.

Aerospace Engineering (ENAE)

Graduate Degree Program
College: Engineering

Abstract

The Aerospace Engineering Department offers a broad program in graduate studies leading to the degrees of Master of Science (thesis and non-thesis) and Doctor of Philosophy. Graduate students can choose from the following areas of specialization: aerodynamics and propulsion; structural mechanics and composites; rotorcraft; space systems; and flight dynamics, stability and control. Within these disciplines, the student can tailor programs in areas such as computational fluid dynamics, aeroelasticity, hypersonics, composites, smart structures, finite elements, space propulsion, robotics, and human factors.

Financial Assistance

A number of graduate assistantships and fellowships are available for financial assistance. Graduate teaching and research assistantships are available beginning at $20,000 per year plus tuition and health benefits. In addition, a number of fellowships are available, such as Minta Martin Fellowships, Rotorcraft Fellowships, the Hokenson Fellowship, ARCS Fellowships, and various departmental fellowships and scholarships. These fellowships cover tuition in addition to a stipend. All full-time applicants are automatically considered for these fellowships.

Contact

Department of Aerospace Engineering
3179 Glenn L. Martin Hall Building
4298 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2376
Fax: 301.314.9001

Website: http://www.aero.umd.edu

Courses: ENAE

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- GRE General highly recommended for applicants seeking financial support
- 3 Letters of Recommendation
- CV/Resume
- GPA: 3.2 for M.S. and 3.5 for Ph.D.

Applicants should have a B.S. degree in Aerospace Engineering (or in a closely related field) with a recommended minimum GPA of 3.2/4.0 from an accredited institution. Applicants with a marginal academic record may be conditionally approved for admission to the M.S. program if other evidence of accomplishment is provided (i.e. publications or exceptional letters of recommendation). Admission to the Ph.D. program requires an academic record indicating promise of the high level of accomplishment required for the degree. The Graduate Record Examination (GRE) is strongly recommended for admission, but only *required* for international applicants.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants:		
US Citizens and Permanent Residents	Preferred: 1 Feb / Final: 16 May	Preferred: 29 Sep / Final: 1 Nov
International Applicants:		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	Preferred 1 Feb / Final: 1 Mar	Preferred: 15 Sep / Final: 28 Sep

Other Deadlines: Please visit the program website at http://www.aero.umd.edu

Requirements

- Aerospace Engineering, Doctor of Philosophy (Ph.D.) (p. 25)
- Aerospace Engineering, Master of Science (M.S.) (p. 25)

Facilities and Special Resources

The departmental facilities for experimental research include the Glenn L. Martin Wind Tunnel, the Composites Research Laboratory, the Space Systems Laboratory, and the facilities of the Center for Rotorcraft Education and Research. The Glenn L. Martin Wind Tunnel, with its 8-foot high by 11-foot wide test section, has a maximum operating speed of 330 feet per second. It is used extensively for development testing by industry as well as for research. There are also two smaller subsonic tunnels and a supersonic tunnel that are used in support of departmental research programs.

The Composites Research Laboratory is located in the Manufacturing Building. Its facilities include a microprocessor-controlled autoclave, a vacuum hot press, a two-axis filament winding machine, an MTS 220 Kip uniaxial testing machine, an x-ray machine and an environmental

conditioning chamber. The laboratory provides for a full spectrum of specimen and component manufacture, preparation and instrumentation, inspection, and testing. The Space Systems Laboratory performs world-class research on space operations, with particular emphasis on neutral buoyancy simulation of space robotics and human factors. The Neutral Buoyancy Research Facility is a multi-million dollar laboratory built around a 50-foot diameter by 25-foot deep water tank for simulating the microgravity environment of space. Six different telerobotic systems are currently under test in this facility, which is one of only two operating in the United States and the only neutral buoyancy facility in the world to be located at a university. The facilities of the Alfred Gessow Rotorcraft Center include two experimental rotor rigs to test articulated and bearingless rotors in hovering and in forward flight. The hover test facility can accommodate up to a 6-foot diameter rotor. In addition, the facilities include a 10-foot diameter vacuum chamber to study the structural dynamic characteristics of spinning rotors in the absence of aerodynamic loads and a three-component laser Doppler anemometer for flowfield measurements. A new 20-foot by 20-foot by 30-foot anechoic acoustic test chamber is used to carry out impulsive noise studies of rotorcraft in hover. Dynamic scaled rotor blades are built using composite facility

Aerospace Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
Select 30 credits approved by the student's advisor		30
Total Credits		30

Aerospace Engineering (PMAE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Aerospace program prepares graduates to design, develop, and test aircraft, spacecraft, and missiles and supervise their manufacture. Students earning a Masters of Engineering degree will also gain the expertise needed to develop new technologies in areas such as structures, propulsion systems, vehicle movement and control, communications, and overall vehicle design for use in aviation, defense systems, and space exploration.
For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. Tuition and fees are subject to change.

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/aerospace.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Aerospace Engineering, Master of Engineering (M.Eng.) (p. 27)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Aerospace Engineering, Post-Baccalaureate Certificate (P.B.C.)

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Students complete **12 credits** in one of the following specializations:

General

Course	Title	Credits
Select four courses and include at least one course from each of the three specializations:		12
ENAE641	Linear System Dynamics	
ENAE642	Atmospheric Flight Control	
ENAE654	Mechanics of Composite Structures	
ENAE655	Structural Dynamics	
ENAE656	Aeroelasticity	
ENAE674	Aerodynamics of Compressible Fluids	
ENAE676	Turbulence	
Total Credits		12

Rotocraft

Course	Title	Credits
Select four of the following:		12
ENAE631	Helicopter Aerodynamics I	
ENAE632	Helicopter Aerodynamics II	
ENAE633	Helicopter Dynamics	
ENAE634	Helicopter Design	
ENAE635	Helicopter Stability and Control	
Total Credits		12

Space

Course	Title	Credits
Select four of the following:		12
ENAE601	Astrodynamics	
ENAE602	Spacecraft Attitude Dynamics and Control	
ENAE691	Satellite Design	
ENAE694	Spacecraft Communications	
ENAE696	Spacecraft Thermal Design	
ENAE741	Interplanetary Navigation and Guidance	
ENAE791	Launch and Entry Vehicle Design	
Total Credits		12

Aerospace Engineering (Z053)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Aerospace program prepares graduates to design, develop, and test aircraft, spacecraft, and missiles and supervise their manufacture. Students earning a Masters of Engineering degree will also gain the expertise needed to develop new technologies in areas such as structures, propulsion systems, vehicle movement and control, communications, and overall vehicle design for use in aviation, defense systems, and space exploration.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. Tuition and fees are subject to change.

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/aerospace (https://advancedengineering.umd.edu/aerospace).

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Aerospace Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 28)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

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African American Studies, Post-Baccalaureate Certificate (P.B.C.)

Course	Title	Credits
Core Requirements		
AASP611	Classic Texts and Contemporary Issues	3
AASP621	Public Policy and Black Communities	3
Select one additional AASP course		3
Select two electives		6
Select a Graduate Research Project or Practicum Internship		3
Total Credits		18

African American Studies (Z096)

Graduate Certificate Program
College: Behavioral and Social Sciences

Contact

African American Studies Department
1119 Taliaferro Hall
4280 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.1158
Fax: 301.314.9932

Website: http://www.aasd.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.aasd.umd.edu

Requirements

- African American Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 29)

Agricultural and Resource Economics, Master of Science (M.S.)

Non-thesis only (scholarly paper required): 33 credits

Course	Title	Credits
Required courses:		
ECON603	Microeconomic Analysis I	3
AREC623	Applied Econometrics I	4
AREC624	Applied Econometrics II	4
AREC620	Optimization in Agricultural and Resource Economics	3
AREC610	Microeconomic Applications in Agricultural and Resource Markets	3
Select 16 credits of electives [1]		16
Defense of a scholarly paper		
Total Credits		33

[1] Elective courses are normally selected from M.S. level courses (600 level or above) in AREC or ECON but may be taken in other disciplines with adviser approval

The M.S. program trains students to conduct economic research in the fields of environmental and resource economics, agricultural economics, and development economics. It provides rigorous training in microeconomic theory and econometrics and in the application of microeconomics and econometrics to policy issues. Students completing their MS degrees go on to work in U.S. government agencies and international organizations.

Required courses for the M.S. program consist of basic coursework in microeconomic theory and econometrics:

- The first semester of the sequence in microeconomic theory (ECON603).
- A two-semester sequence in applied econometrics (AREC623 and AREC624).
- A one-semester course on mathematical optimization (AREC620).
- A one-semester course on applications of microeconomic theory to agricultural and resource economics (AREC610).

The first-year coursework normally includes these 17 credits (3 credits each for ECON603, AREC620, AREC610 plus 4 credits each for AREC623 and AREC624).

M.S. students fulfill additional coursework requirements by taking electives to suit their own interests during their second year. Elective courses are normally selected from M.S. level courses (600 level or above) in AREC or ECON but may be taken in other disciplines with adviser approval. For detailed information on the scholarly paper, see the 'MS Scholarly Paper Requirement' at http://www.arec.umd.edu/graduate/ms/ms-scholarly-paper-requirement

Agricultural and Resource Economics, Doctor of Philosophy (Ph.D.)

Requirements for the Ph.D. degree include a minimum of 42 credits of coursework, completion of a four course field, 12 credits of Ph.D. dissertation research (AREC899), development of a research paper worthy of submission to a well-regarded journal, development and defense of a dissertation prospectus, and successful defense of a Ph.D. dissertation.

Course	Title	Credits
Required courses:		
ECON603	Microeconomic Analysis I	3
AREC623	Applied Econometrics I	4
AREC624	Applied Econometrics II	4
AREC620	Optimization in Agricultural and Resource Economics	3

AREC610	Microeconomic Applications in Agricultural and Resource Markets	3
ECON604	Microeconomic Analysis II	3
Select six elective courses, at least four of which must be chosen from the following:		18
AREC783	Environmental Taxation and Regulation	
AREC785	Advanced Economics of Natural Resources	
AREC815	Experimental and Behavioral Economics	
AREC825	Advanced Economic Welfare Analysis	
AREC832	Advanced Agricultural Policy Analysis	
AREC845	Environment and Development Economics	
AREC846	Development Microeconomics	
ECON781	Valuing Environmental Benefits	
AREC891	Introduction to Prospectus Development [1]	1
AREC892	Dissertation Prospectus Development [2]	3
Dissertation Research Requirements		
AREC899	Doctoral Dissertation Research (minimum of 12 research credits)	12
Total Credits		54

1 During the spring semester of their second-year, students are also required to take a 1-credit course intended to help students develop a dissertation topic.

2 This requirement is waived for any student who has completed a dissertation prospectus and passed a prospectus examination before the fall semester of the third year.

The Ph.D. program trains students to design, perform, lead, and implement economic research projects in the fields of environmental and resource economics, agricultural economics, and development economics. It also trains students in how to disseminate research results in the major professional media including journals, reports, conferences, and seminars. It provides rigorous training in microeconomic theory and econometrics and in the application of microeconomics and econometrics to policy issues. Students completing their Ph.D. degrees find employment in academia, U.S. government agencies, international organizations, and consulting firms.

The first year of the program consists of basic coursework in microeconomic theory, econometrics, and mathematical methods. It consists of the following courses: A two-semester sequence in microeconomic theory (ECON603 and ECON604); A two-semester sequence in applied econometrics (AREC623 and AREC624); A one-semester course on mathematical optimization (AREC620); A one-semester course on applications of microeconomic theory to agricultural and resource economics (AREC610).

Students must earn a 'B-' or better in each of these courses and a B (3.0) average or better in graduate coursework. If necessary, students can re-take these courses one time to achieve this standard. The first-year course requirements account for 20 credits (3 credits each for ECON603, ECON604, AREC620, and AREC610, plus 4 credits each for AREC623 and AREC624). First-year students are also expected to complete self-directed instruction regarding econometric software during August and January, attend additional instruction and develop qualifying paper topics during January, and participate in a paper-writing workshop in June at the end of the first year. The June workshop helps students develop their research for publication in academic journals as well as oral presentation. This workshop is useful for fostering the completion of the required research paper.

The second year of the program consists mainly of six elective courses. All students are required to take four courses from among the following courses offered in AREC: AREC783, AREC785, AREC815, AREC825, AREC832, AREC845, AREC846, and ECON781 with the remainder from that list, from graduate courses offered by the Economics Department or (with approval by the Director of Graduate Studies) from another supporting department on campus.

Agricultural and Resource Economics (AREC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Department offers both M.S. and Ph.D. degrees from one of the nation's premier graduate programs in agricultural and resource economics. Both programs focus on the application of advanced microeconomic theory and econometrics to issues in environmental and resource economics, agricultural economics, and development economics. Courses are taught by leading researchers in those fields, who combine rigorous scholarship with extensive policy experience.

The Department's faculty includes internationally prominent scholars in environmental and resource economics, agricultural economics, and development economics. In recognition of their research, Department faculty members have received such international awards as Germany's Alexander von Humboldt Prize, the American Economic Association's John Bates Clark Medal, and the Agricultural and Applied Economics Association's Quality of Research Discovery and Publication of Enduring Quality Awards, among others. Several have been elected fellows of such professional associations as the Agricultural and Applied Economics Association (formerly the American Agricultural Economics Association), the Association of Environmental and Resource Economics, the Econometric Society, and the American Statistical Association. Department faculty members have served as presidents of the American Agricultural Economics Association and Association of Environmental and Resource Economists and as editors and associate editors of the Journal of Environmental Economics and Management, the American Journal of Agricultural Economics, the Journal of Public Economics, and Environment and Development Economics, among others. One faculty member is currently a research fellow of the National Bureau of Economic Research. For additional Department highlights, please visit www.arec.umd.edu/graduate/prospective-students.

The policy experience of the Department's faculty is equal to its scholarship in both quality and extent. Three have served on the staff of the President's Council of Economic Advisers. Other policy experience includes service as consultants to agencies and organizations like the U.S. Department of Justice, the U.S. Department of Agriculture, the Environmental Protection Agency, the World Bank, and the Inter-American Development Bank. The University's location in the Washington, D.C., area provides numerous opportunities for interaction with the World Bank, International Food Policy Research Institute, Resources for the Future, International Monetary Fund, U.S. Department of Agriculture, U.S. Environmental Protection Agency, U.S. Agency for International Development, Food and Drug Administration, Inter-American Development Bank, Census Bureau, and a host of other such institutions

and organizations. Questions about the Department's graduate programs should be directed to the Graduate Program Coordinator at arecgradpgm@umd.edu or 301-405-1820.

Financial Assistance

Graduate assistantships are offered to qualified applicants on the basis of past academic performance, research potential, and availability of funds. Many full-time students in the Department hold assistantships or some other form of financial aid. Part- time and summer work are sometimes available for students who do not have assistantships. Graduate fellowships are also available on a competitive basis.
The Department offers financial assistance in the form of graduate assistantships and fellowships. All applications are consideration for financial assistance.

Graduate Assistantships

Many of our students are supported by graduate assistantships with responsibilities for either research or teaching. Graduate assistants are expected to work an average of 20 hours a week on their research or teaching duties. They must maintain at least a B average. They are considered employees of the University and are thus covered by health insurance. In addition to a competitive salary, graduate assistants receive tuition remission for up to 10 credits in the fall and spring semesters and up to 8 credits each summer semester.

Fellowships

The Department awards a number of fellowships each year to highly qualified applicants. Annual fellowship stipends are highly competitive. Fellowship awards also include tuition remission of up to twelve credits per semester. Fellowships are awarded to Ph.D. students for two (2) years. After the expiration of the fellowship, the Department expects to provide Ph.D. fellowship recipients with an additional two years of support as a graduate assistant subject to satisfactory academic progress. All applicants for financial aid are automatically considered for fellowships as well as assistantships.

Financial assistance in the form of loans and work study may also be available. Interested students should contact the University's Office of Student Financial Aid.

Contact

The AREC Graduate Program website at http://www.arec.umd.edu/graduate provides course requirements, examination procedures, and descriptive material for the M.S. and Ph.D. programs.

Department of Agricultural and Resource Economics
2200 Symons Hall
7998 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1293
Email: arecgradpgm@umd.edu

Website: http://www.arec.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://drupal-base-s3-drupalshareds3-1qwpjwcnqwwsr.s3.amazonaws.com/gradschool/s3fs-public/uploads/admissionsforms/umd_supplementary_application_arec.pdf)

At a minimum, students entering either the Department's M.S. or Ph.D. program are expected to have the following preparation:

1. Knowledge of macroeconomic theory at the intermediate level and microeconomic theory at the advanced level.
2. Knowledge of multivariate calculus and linear algebra.
3. Knowledge of elementary statistical methods.

Additional coursework in mathematics is desirable--for example, analysis, probability, advanced statistics, or differential equations.

Students are normally admitted to the MS and PhD programs only for the fall semester, because the first year program consists of course sequences that begin only in the fall.

Transfer from M.S. to Ph.D. Program

Students enrolled in the Department's M.S. program may apply for admission to the Department's Ph.D. program by submitting a new Graduate School application, supplemental transcripts, and three letters of recommendation. The Graduate School application fee is waived if the student applies for the Ph.D. program in or before the semester in which the M.S. degree will be completed. Students within the Department's M.S. program need not submit GRE's when applying for the Ph.D. program.

The University of Maryland's Graduate School accepts applications through its ApplyYourself/Hobsons (link is external) application system. Before completing the application, applicants are asked to check the Admissions Requirements (link is external) site for specific instructions.

As required by the Graduate School, all application materials are to be submitted electronically.

The electronic submission of application materials helps expedite the review of an application. Completed applications are reviewed by an admissions committee in each graduate degree program. The recommendations of the committees are submitted to the Dean of the Graduate School, who will make the final admission decision. Students seeking to complete graduate work at the University of Maryland for degree purposes must be formally admitted to the Graduate School by the Dean.

Information for International Graduate Students

The University of Maryland is dedicated to maintaining a vibrant international graduate student community. The office of International Students and Scholars Services (http://globalmaryland.umd.edu) (link is external) (ISSS) is a valuable resource of information and assistance for prospective and current international students. International applicants

are encouraged to explore the services they offer, and contact them with related questions. The University of Maryland Graduate School offers admission to international students based on academic information; it is not a guarantee of attendance. Admitted international students will then receive instructions about obtaining the appropriate visa to study at the University of Maryland which will require submission of additional documents. Please see the Graduate Admissions Process for International applicants (https://www.gradschool.umd.edu/admissions/international-admissions) (link is external) for more information.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.arec.umd.edu

Requirements

- Agricultural and Resource Economics, Doctor of Philosophy (Ph.D.) (p. 30)
- Agricultural and Resource Economics, Master of Science (M.S.) (p. 30)

Facilities and Special Resources

The AREC Department provides a 15-seat computer lab for the exclusive use of our graduate students. The lab is available 24 hours a day, 365 days a year. Another 25-seat lab is available by reservation for classes, presentations, and research (e.g., experimental economics sessions). These labs are equipped with thin client devices that connect end users to desktop virtual desktops. This solution allows graduate students to remotely access a virtual desktop with all the applications listed below, as well as their files stored on the network servers. The following applications are available at this time: ArcInfo, Fortran, Mathematica, Matlab, Mozilla Firefox, MS Office, R, SAS, Stata, StatTransfer,TextPad, Lyx and WinEdt. Graduate students can access the AREC network and Internet from home via several remote access methods. A multifunction printer/scanner/copier is available in the graduate student computer lab. Wireless access is available to the campus network.

The Department offers close proximity to an incomparable array of government agencies, international institutions, and non-governmental organizations devoted to environmental issues, agricultural policy, natural resource management, and international development. Opportunities for attending stimulating seminars abound. Many students find useful work experience, access to data, and cutting-edge thesis topics as well as future employment through these organizations. These include (all within approximately 10 miles) the U.S. Environmental Protection Agency, the U.S. Department of Agriculture and U.S. Economic Research Service, the U.S. Food and Drug Administration, Resources for the Future, the Joint Institute for Food Science and Nutrition, the Joint Global Change Research Institute, the National Center for Smart Growth Research and Education, the National Oceanic and Atmospheric Administration, the World Bank, the Inter-American Development Bank, the International Food Policy Research Institute, the Beltsville Agricultural Research Center with its National Agricultural Library, as well as the U.S. Capitol, Senate, and House of Representatives.

Air Quality Science and Technology, Post-Baccalaureate Certificate (P.B.C.)

Course	Title	Credits
Core Requirements		
AOSC600	Synoptic Meteorology I	3
AOSC624	Remote Sensing of Surface Climate	3
AOSC637	Atmospheric Chemistry	3
AOSC633	Atmospheric Chemistry and Climate	3
Total Credits		12

Air Quality Science and Technology (Z047)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Contact

Department of Atmospheric and Oceanic Science
3417 Atlantic Building
4254 Stadium Dr
University of Maryland
College Park, MD 20742
Telephone: 301.405.5391

Website: http://www.aosc.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Jun	17 Nov
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.aosc.umd.edu

Requirements

- Air Quality Science and Technology, Post-Baccalaureate Certificate (P.B.C.) (p. 33)

American Studies, Master of Arts (M.A.)

Thesis option: 30 credits required
Non-thesis option: 30 credits required

Students take a total of 30 credits of coursework in American Studies and related disciplines and demonstrate the ability to conduct independent research by submitting an acceptable thesis or a scholarly paper in lieu of a thesis.

Course	Title	Credits
Core Requirements		
AMST601	Introductory Theories and History in American Studies	3
Select one Methods Seminar course		3
Select AMST designated seminar courses		9
Thesis or Non-Thesis Requirements		
Select one of the following options:		15
Thesis:		
AMST799	Master's Thesis Research	
Select nine additional course credits		
Non-Thesis:		
Select 15 additional course credits and completion of a scholarly paper		
Total Credits		30

American Studies, Doctor of Philosophy (Ph.D.)

Doctoral students entering with a Bachelor's degree must complete a minimum of 42 credits of coursework. Doctoral students entering with a Master's degree must complete a minimum of 30 credits of coursework. All doctoral students are required to complete 12 credits of dissertation research. Students must also pass two comprehensive examinations (one general, the other specialized) and, after submitting a detailed prospectus, write and defend an interdisciplinary dissertation that answers significant questions about American culture(s) and experiences, past or present.

Students entering Ph.D. program with only a Bachelor's degree

Minimum of 42 credits required

Course	Title	Credits
Core Requirements		
AMST601	Introductory Theories and History in American Studies	3
AMST603	Current Approaches to American Studies	3
AMST898	Pre-Candidacy Research	3
Select nine credits of AMST designated seminar courses		9
Select a three-credit methods seminar course		3
Specialization Requirements		
Select 18 credits of specialization courses, with nine credits in each		18
Dissertation Research Requirements		
AMST899	Doctoral Dissertation Research	12
Total Credits		51

Students entering Ph.D. program with a Master's degree

Minimum of 30 credits required

Course	Title	Credits
Core Requirements		
AMST601	Introductory Theories and History in American Studies	3
AMST603	Current Approaches to American Studies	3
AMST898	Pre-Candidacy Research	3
Select nine credits of AMST designated seminar courses		9
Select a three-credit methods seminar course		3
Specialization Requirements		
Select 12 credits of specialization courses, with six credits in each		12
Dissertation Research Requirements		
AMST899	Doctoral Dissertation Research	12
Total Credits		45

American Studies (AMST)

Graduate Degree Program
College: Arts and Humanities

Abstract

American Studies offers an interdisciplinary program of study leading to the Masters of Arts and the Doctor of Philosophy degrees. Research and teaching in the Department focus on two intellectual themes: the cultures of everyday life, and cultural constructions of identity and difference. These themes drive our examinations of multiple cultures within the U.S., across the Americas, and transnationally. They also embrace numerous cultural studies approaches, including material and visual culture, ethnography and life history, popular culture and media studies, queer studies, studies of the body and sexualities, gender studies, food studies, digital cultures, critical race studies, and cultural landscapes and geography. Students develop expertise in multiple methodologies and take courses in many departments across the University. The Department benefits from a large and diverse affiliate faculty, strong relationships with cultural institutions such as the Smithsonian museums, and ready access to many other museums in the Baltimore-Washington corridor, government agencies, archives and historical societies, and multiple local communities. Students may also take advantage of graduate certificate programs for which our courses apply, including Museum Scholarship

and Material Culture, Critical Theory, Historic Preservation, and Women's Studies. The program in U.S. Latina/o Studies is contained within the Department, and we have a leadership role in developing Native American Studies.

Financial Assistance

A limited number of teaching assistantships are available in addition to graduate fellowships. Students who hold assistantships typically teach two sections undergraduate AMST courses.

Contact

Additional information on program offerings, degree requirements, and financial aid can be obtained on the department's Web site **(http://www.amst.umd.edu)** and by writing to out contact address.

Department of American Studies
1328 Tawes Hall
7751 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1354
Fax: 301.314.9453
Email: amst-dgs@umd.edu

Website: http://www.amst.umd.edu

Courses: AMST

Admissions

General Requirements

- Statement of Purpose, including research interests
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- Writing Sample
- CV/Resume

Many admitted students have previously majored in American Studies, History, English, Ethnic Studies, Women's Studies, Anthropology, Art or Architectural History, Journalism, and Communications. However, applicants with broad backgrounds in arts and humanities and/or the behavioral and social sciences are also given serious consideration if interdisciplinary, American Studies-related subject matter or theories have been emphasized. Application requirements for both M.A. and Ph.D. programs include:

International applicants must also submit TOEFL scores. Applicants who do not yet have M.A. degrees and who desire to obtain the Ph.D. degree at Maryland should apply directly to the Ph.D. program.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	14 Dec

Other Deadlines: Please visit the program website at http://www.amst.umd.edu

Requirements

- American Studies, Doctor of Philosophy (Ph.D.) (p. 34)
- American Studies, Master of Arts (M.A.) (p. 34)

Facilities and Special Resources

The Washington, D.C. and Baltimore areas offer extraordinary research facilities for the study of past and present Americans$rsquo; experiences and culture, including the Library of Congress, the National Archives, the Smithsonian's many institutions, the National Park Service, the Maryland Historical Society, and the Walters Art Museum and National Gallery, and other cultural institutions. The National Archives II, National Trust Library and Library of American Broadcasting are all located on the College Park campus. There are also numerous local and regional-focused museums, collections, archives, libraries, and "think tanks" that can support students' interests in issues and topics related to identity and difference and the cultures of everyday lfe. Through consortia arrangements with universities in the area, including George Washington University and Georgetown University, students may augment their programs with courses otherwise unavailable at the University of Maryland.

Animal Sciences, Master of Science (M.S.)

Thesis only: 30 credits

Course	Title	Credits
Core Requirements		
Coursework including courses in Biochemistry, Biometrics, and Research Ethics		24
ANSC698	Seminar	
Thesis Research Requirement		
ANSC799	Master's Thesis Research	6
Total Credits		30

Students are required to complete 24 credits of coursework with at least 12 credits in ANSC designated courses, and a minimum of 12 credits in courses numbered 600 or above. The plan of study should include courses in Biochemistry, Biometrics, and a course in Research Ethics.

During the first semester, the student selects an Adviser and an Advisory Committee (AC) with the approval of the Program Graduate Education Committee. By the end of the second semester, with the AC's advice, students file a proposed schedule of courses (plan of study). Committees may require that students take remedial courses if they enter with inadequate prerequisites or deficiencies in undergraduate programs.

Also, by the end of the second semester a thesis research proposal must be approved by the student's AC. Course requirements comprise at least one semester of Biochemistry (3 credits; typically BCHM463), one semester of Biometrics (4 credits; typically BIOM601), one credit of seminar (ANSC698) and a course in Research Ethics. Additional credits of graduate coursework should result in a total of 24 credits, of which no more than 12 credits can be at the 400 level. Furthermore, a minimum of six hours of thesis research credit (ANSC799) is required. Towards the end of their graduate studies, students must present the results and conclusions of their research in a public seminar and successfully defend their written thesis in a final oral examination, which is given by the AC. A final copy of the thesis must be submitted to the Program Office. Students with adequate undergraduate training usually complete the master's degree within two years.

Animal Sciences, Doctor of Philosophy (Ph.D.)

1. All Ph.D. candidates must also meet the course requirements for the M.S. degree.
2. PhD students are required to take a total of two credits of seminar, one of which must be ANSC698C. ANSC698C is required of Ph.D. students even if it was taken while in the MS program. The ANSC seminars will be taken in non-consecutive semesters.
3. Before the end of the third semester, the student will also submit to his/her Advisory Committee a dissertation research proposal.
4. During the second year of study for the Ph.D. degree (or after approximately 80 percent of the Plan of Study has been completed), a written examination and an oral comprehensive examination are required for advancement to candidacy.
5. One semester of teaching experience (8-10 hours per week) are required during study for the Ph.D. degree.
6. Students must complete a minimum of 12 research credits by enrolling in ANSC899.

Ph.D. students with Master's degrees from other institutions are expected to meet the requirements indicated above for the ANSC M.S. degree. The M.S. degree is not a prerequisite but is advantageous for admission to the Ph.D. program. At least two credits of Seminar (with at least one in ANSC698) and one semester of teaching experience (8-10 hours per week) are required during study for the Ph.D. degree. In addition, a minimum of 12 research credits is required. A plan of study and a research proposal must be filed with the approval of the student's Adviser and Advisory Committee (AC) by the end of the second semester. After no more than five semesters, the student must pass the Admission to Candidacy Examination, which consists of both written and oral components and is administered by the AC. Towards the end of their studies, the candidates present the results and conclusions of their graduate research in a public seminar and defend their research in an oral examination, which is adjudicated by the student's AC. In addition to successful defense of the dissertation, it is expected that the student will publish at least one paper in a refereed scientific journal, based on the dissertation research. A final bound copy of the dissertation must be submitted to the Program Office. The Ph.D. degree is usually completed within four to six years.

Course	Title	Credits
Core Requirements		
Two credits of Seminar		2
ANSC698	Seminar (ANSC698C)	
Dissertation Research Requirements		
ANSC899	Doctoral Dissertation Research	12
Total Credits		14

Animal Sciences (ANSC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Graduate Program in the Animal Sciences offers graduate study leading to the Master of Science and Doctor of Philosophy degrees. The master's degree program does not offer the non-thesis option. Faculty research interests include:

1. Cell, molecular and developmental biology studies, gene expression of the neuroendocrine system during growth and development, molecular genetics of metal and heme homeostasis in animals, maintenance of pluripotency and cell lineage determination in early embryos and embryonic stem cells, regulation of gene expression during embryonic patterning, neuro- and reproductive endocrinology in avian species, and virology, immunology and microbial pathogenesis of significance to animal agriculture;
2. Nutrition and intermediary metabolism of ruminants and non-ruminants, regulation of milk fat production in dairy cattle, modeling for nutrient management, nutrient management in avian and other monogastric species, including forage utilization in horses; nutritional immunology, nutrient sensing, metabolic homeostasis, companion and exotic animal nutrition;
3. Aquaculture related fish physiology and cryopreservation of germ cells, and;
4. Application of computational and systems biology to quantitative genetics, genomics, epigenetics, selection theory and breeding for the improvement of domestic animals and conservation genetics.

Financial Assistance

A number of graduate combined research/teaching assistantships are available and awarded to students who present strong academic records and a capability and motivation to perform well in teaching or in research assignments. These assistantships are awarded on a competitive basis. Appointments are on an annual basis, with reappointment contingent on demonstration of successful progress towards the degree. Assistantships are available for up to two years for the M.S. degree and four years for the Ph.D. degree. As assistantships are generally awarded for Fall admittance, applications should be completed by the January 15 deadline for consideration.

Contact

For specific information on the program, admission procedures, or financial aid, see the ANSC website (http://ansc.umd.edu/graduate) or contact the ANSC graduate program office as listed below.

Dr. Carol L. Keefer
Professor and Director, Graduate Program in Animal Sciences
Department of Animal and Avian Sciences
2129 Animal Sciences Center
8127 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5781

Email: ansc-gradprogram@umd.edu

Victoria Lake
ANSC Graduate Office
Department of Animal and Avian Sciences
1415A Animal Sciences Center
8127 Regents Drive
University of Maryland
College Park, MD 20740
Telephone: 301.405.5781
Email: ansc-gradprogram@umd.edu

Website: http://www.ansc.umd.edu

Relationships: Neurosciences and Cognitive Science (NACS) (p. 316), Veterinary Medical Sciences (VMSC) (p. 423)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationansc.pdf)

The Program requires applicants to submit an application online, and to submit official academic transcripts, statement of goals and research interests, at least three letters of recommendation, and official Graduate Record Examination scores to the Enrollment Services Operations Office. Applicants with degrees from non-English speaking countries and who have not received a degree from the list of approved English-speaking universities must also submit results of the Test of English as a Foreign Language (TOEFL). To be considered for an assistantship, submit your application by the preferred deadline.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 May	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.ansc.umd.edu

Requirements

- Animal Sciences, Doctor of Philosophy (Ph.D.) (p. 36)
- Animal Sciences, Master of Science (M.S.) (p. 35)

Facilities and Special Resources

The Department of Animal and Avian Sciences and the nearby Gudelsky Veterinary Center housing the Virginia-Maryland Regional College of Veterinary Medicine, have extensive facilities consisting of faculty research laboratories, animal holding areas, a campus farm, aquaculture facility and outlying research farms. Additionally, the department maintains two computer laboratories with 30 workstations in the teaching laboratory, and a smaller laboratory exclusively for the use of graduate students on a 24 hour basis.

The research laboratories comprise nearly 28,000 square feet for bench work, averaging over 1000 square feet per faculty member. Over 2800 square feet of cold room and 2000 square feet of freezer rooms are integral components of the research laboratories. The laboratories are fully equipped with state-of-the-art modern instrumentation and equipment for the entire range of research carried out by the faculty, e.g. research in biochemistry, cell-molecular biology, physiology, nutrition, behavior, virology, immunology, microbial pathogenesis etc. Individual laboratories are fully self-standing units, yet there is free exchange between laboratories having shared and collaborative interests. All the laboratories and offices are networked to the campus server for direct Internet access.

Nearly 15,000 square feet of space is dedicated for animal holding in the Animal Wing of the Animal Sciences Center. This facility is capable of handling all kinds of animals such as rodents, birds, fish and large animals for research in separate rooms. A new aquaculture facility, adjoining the Gudelsky Center, is also available. The Animal Wing is under the care of trained staff and is supervised by a professional veterinarian.

Other facilities, such as the Laboratory for Biological Ultrastructure, the Visual Imaging Center, the DNA Sequencing Laboratory,the Proteomics Core Facility, etc., are available to the faculty and students as part of the Central Core Facilities on the campus.

Off Campus Research Facilities include:

1. University of Maryland/USDA-Beltsville Animal Biotechnology Facility An 11,000 square foot cooperative facility for research in animal biotechnology at the Beltsville Agricultural Research Center. This Center includes laboratories specifically designed for research in cloning and transgenic biology. ANSC faculty engaged in nuclear cloning, stem cell and transgenic biotechnology may use this facility to investigate genes of significance for the growth, development and physiology of domestic animals.
2. Central Maryland Research and Education Center, Clarksville, MD This 925-acre dairy research center, located ~25 miles from the campus, houses 200 head of Holstein dairy cattle including 110 milking cows and 90 head of young stock. ANSC faculty engaged in nutrition, reproduction, physiology, herd health, behavior and management research, conduct their experiments at this facility.
3. Applied Poultry Research Laboratory, Upper Marlboro, MD

This 202-acre facility is located approximately 20 miles from the campus. It is used for conducting research in nutrition, physiology and behavior.

4. Wye Beef Cattle Research Center
   This 450-acre facility is located on Maryland's Eastern Shore near Queenstown. It has 250 registered Angus beef cows plus young stock and bulls which are direct descendants of the Wye Angus herd. The facility is used to support research associated with beef cow-calf management, pasture management and growth physiology.

Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.)

Non-thesis only (internship required): 66 credits

The Applied Anthropology and Historic Preservation dual degree takes full advantage of the diverse coursework offered at the University's School of Architecture, Planning and Preservation and the Department of Anthropology, bringing together expertise in archaeology, vernacular architecture, ethnography, cultural resource management, heritage studies and social/cultural anthropology. A total of 66 credit hours are required for the MAA/MHP dual degree.

Course	Title	Credits
Anthropology courses		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3
ANTH649	Advanced Developments in Archaeology	3
or ANTH449	Advanced Special Topics in Archaeology	
ANTH722	Ecological Anthropology	3
ANTH740	Theories of the Past and Accomplishments of Archaeology	3
ANTH760	Development of Social/Cultural Theory	3
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Historic Preservation courses		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
or ANTH698 (Al		
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP690		2
HISP650	Historic Preservation Studio Workshop	6
Total Credits		66

Anthropology, Master of Applied Anthropology (M.A.A.)

Non-thesis only: 42 credits

Course	Title	Credits
Core Requirements		
Core Courses:		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH760	Development of Social/Cultural Theory	3
ANTH722	Ecological Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3
ANTH740	Theories of the Past and Accomplishments of Archaeology	3
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Supporting Coursework		12
Total Credits		42

The program requires 42 credit hours of coursework, including a core sequence (18 credit hours), an internship sequence (12 credit hours), and a sequence of individually approved courses that are related to a chosen domain of application (12 credit hours). MAA students must satisfactorily complete an internship proposal review with their advisory committee before beginning the internship, which is normally completed during the summer term between the first and second years of the program. Students are also required to present the results of their internship in a departmental colloquium prior to graduation. There is no thesis requirement.

Anthropology, Doctor of Philosophy (Ph.D.)

Students entering the doctoral program with a Bachelor's degree must complete 72 credits, including 12 credits of ANTH899. Students entering the doctoral program with a Master's degree are not required to complete the 12 credit-internship sequence, and must complete 60 credits.

Students Entering the Doctoral Program with a Bachelor's Degree

Course	Title	Credits
Core Requirements		
Course Requirements:		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH760	Development of Social/Cultural Theory	3

ANTH722	Ecological Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3
ANTH740	Theories of the Past and Accomplishments of Archaeology	3
Select 12 credits of Approved Electives		12
Select 18 credits of Advanced Coursework		18
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Dissertation Research Requirements		
ANTH899	Doctoral Dissertation Research	12
Total Credits		72

Students Entering the Doctoral Program with a Master's Degree

Course	Title	Credits
Core Requirements		
Course Requirements:		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH760	Development of Social/Cultural Theory	3
ANTH722	Ecological Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3
ANTH740	Theories of the Past and Accomplishments of Archaeology	3
Select 12 credits of Approved Electives		12
Select 18 credits of Advanced Coursework		18
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Total Credits		60

Students entering the PhD from a Bachelor's degree must normally complete all the requirements for the MAA degree indicated above, although the internship sequence can be substituted with additional coursework under approved circumstances. An additional minimum of 30 credit hours of advanced coursework is required, to include at least 12 credit hours of dissertation research. For students entering the PhD program from the MAA, an additional minimum of 30 credit hours of advanced coursework is required, to include at least 12 credit hours of dissertation research. Students entering the PhD program with a master's degree from another institution are minimally required to complete the 18 credit-hour core sequence of the MAA program and an additional minimum of 30 credit hours of advanced coursework, to include at least 12 credit hours of dissertation research. These students are not normally required to complete the internship sequence, although in some cases their doctoral committee may decide that an internship may be appropriate to enhance a student's professional experience prior to graduation. Additional supportive coursework may be required on a case-by-case basis depending on the qualifications of the student. In such cases, these expectations will be specified upon admission to the PhD program. Substitutions for courses in the MAA core sequence are rarely permitted and must be approved by the Graduate Committee and the Department Chair. Students admitted to the PhD program advance to candidacy upon completion of a written comprehensive examination and an oral defense of their dissertation proposal. An oral defense upon completion of the dissertation is also required.

Anthropology (ANTH)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Department of Anthropology offers graduate study leading to the Master of Applied Anthropology (MAA) and the Doctor of Philosophy (PhD) degrees. Both degrees reflect the department's special interest and expertise in the applications of anthropology. Current faculty members represent the subfields of the discipline (archaeology and socio-cultural anthropology). Drawing their intellectual and applied orientations from training and application of the above subdisciplines, the department's faculty also recognize the need to identify topics or problems where the expertise of individual faculty members can be applied in a manner that integrates the subdisciplines. In this ongoing effort, the faculty has identified three areas of research concentration: Anthropology of Health, Anthropology of Environment, and Anthropology of Heritage. The areas can be thought to contain and generate research problems of interest to the faculty's experience and expertise within the subdisciplines. These problems can be addressed individually through socio-cultural anthropology and archaeology. However, the anthropological contribution to addressing these problems is enhanced by collaboration across subdiscipline interests and expertise.

The Master of Applied Anthropology (MAA) is a program designed both for students interested in an anthropology career outside of academia and for those who plan on continuing to a PhD. The program has been offered at the University of Maryland since 1984, and graduates have successfully secured employment or pursued doctoral work in a variety of fields, such as working in the areas of medical and health practice, urban and regional planning and development, community development, conservation and heritage resource development, cultural resource management, and historical archaeology. The focus of the MAA program has been to participate in the building of anthropological practice. A major focus of the Doctor of Philosophy (PhD) program is to direct research scholarship and to encourage theoretical and methodological advancement in such a way as to reflect upon the specific practices of anthropology, with the aim of improving those practices and thereby increasing the value and usefulness of the discipline. Doctoral students are typically prepared for research and development careers outside of academic settings, as well as for academic careers in anthropology departments and other disciplinary settings.

Financial Assistance

A limited number of Departmental Fellowships and Teaching Assistantships are available to qualified graduate students. Part-time employment related to department research is occasionally available.

Doctoral students have the option of applying for Fellowships in Support of Diversity and Inclusion (https://anth.umd.edu/content/graduate-admissions). If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences (2017-18), please be sure to upload your materials under "Supplementary Application" when submitting your online admissions application.

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Website: http://www.anth.umd.edu

Courses: ANTH

Relationships: Applied Anthropology and Historic Preservation (AAHP) (p. 41), Historic Preservation (HISP) (p. 238), Women's Studies (WMST) (p. 426)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample
- Faculty of Interest (suggested for Ph.D. applicants)
- Additional Educational Experiences (all applicants are highly encouraged to respond)

Doctoral students have the option of applying for Fellowships in Support of Diversity and Inclusion (https://anth.umd.edu/content/graduate-admissions). If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences (2017-18), please be sure to upload your materials under "Supplementary Application" when submitting your online admissions application.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.anth.umd.edu

Requirements

- Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.) (p. 38)
- Anthropology, Doctor of Philosophy (Ph.D.) (p. 38)
- Anthropology, Master of Applied Anthropology (M.A.A.) (p. 38)

Facilities and Special Resources

The Department of Anthropology has four archaeology labs: the Archaeological Heritage Lab, a lab related to the Archaeology in Annapolis project, a lab related to Irish Rural Lifeways, and a Zooarchaeology lab. Additional research facilities include the Center for Heritage Resource Studies (CHRS), which conducts and supports basic and applied research in heritage resource studies, one Ecological Anthropology lab, a Human Complexity and Modelling lab, and the Immigrant Life Course Research Program.

Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.)

Non-thesis only (internship required): 66 credits

The Applied Anthropology and Historic Preservation dual degree takes full advantage of the diverse coursework offered at the University's School of Architecture, Planning and Preservation and the Department of Anthropology, bringing together expertise in archaeology, vernacular architecture, ethnography, cultural resource management, heritage studies and social/cultural anthropology. A total of 66 credit hours are required for the MAA/MHP dual degree.

Course	Title	Credits
Anthropology courses		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3
ANTH649	Advanced Developments in Archaeology	3
or ANTH449	Advanced Special Topics in Archaeology	
ANTH722	Ecological Anthropology	3

ANTH740	Theories of the Past and Accomplishments of Archaeology	3
ANTH760	Development of Social/Cultural Theory	3
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Historic Preservation courses		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
or ANTH698 (Al		
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP690		2
HISP650	Historic Preservation Studio Workshop	6
Total Credits		66

Applied Anthropology and Historic Preservation (AAHP)

Graduate Degree Program
College: Behavioral and Social Sciences / Architecture

Abstract

The University of Maryland's Dual degree Master's Program in Applied Anthropology and Historic Preservation is a holistic, comprehensive primer for a professional career in the research, understanding and preservation of cultural resources and heritage. The first of its kind in the United States, the new degree prepares students for the challenges—and increasing demand—of understanding, documenting and saving a wide range buildings, landscapes, sites and communities.

Why a Dual Degree?

Despite many overlapping themes, applied anthropology and historic preservation are very specific in their scope. Yet, as issues related to global heritage grow more complex, there is an increased demand for professionals who can transcend the multiple aspects of preservation and heritage. The new degree program positions students interested in pursuing a career in cultural heritage with a unique and competitive advantage; a comprehensive insight into both tangible heritage, such as architecture, artifacts and natural forms; and the intangible resources of society and culture. The experiential foundation offered by the two programs—including regional and international field studies, excavations and the use of LiDAR technology—offers the practical knowledge needed to succeed in an increasingly competitive and changing global market.

The Applied Anthropology and Historic Preservation dual degree takes full advantage of the diverse coursework offered at the University's School of Architecture, Planning and Preservation and the Department of Anthropology, bringing together expertise in archaeology, vernacular architecture, ethnography, cultural resource management, heritage studies and social/cultural anthropology. The establishment of the dual degree forwards the University's mission of continued educational development that fosters innovation and entrepreneurship, and addresses its commitment to reducing student debt through more affordable degree options.

Financial Assistance

The principal form of financial aid for students in this program consists of graduate assistantships related to research and outreach activities. Assistantships are offered by both Anthropology and Historic Preservation, and consist of tuition remission as well as a stipend. In addition, the HISP Program awards--in conjunction with local non-profit Prince George's Heritage--the Prince George's Heritage Preservation Fellowship, an annual competitive award for a HISP student or students whose Prince George's County related project is judged to be especially outstanding. Additionally, there are possibilities for paid internships and paid part-time work with a variety of national and local organizations and governmental agencies.

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Website: http://www.arch.umd.edu or http://www.anth.umd.edu

Relationships: Historic Preservation (HISP) (p. 238)

Admissions
General Requirements

- Statement of Purpose:
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)

- CV/Resume
- Writing Sample
- Must be admitted by both programs to pursue dual degree.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	6 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	6 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu or http://www.anth.umd.edu

Requirements

- Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.) (p. 40)

Applied Counseling and Human Services, Post-Baccalaureate Certificate (P.B.C.)

Course	Title	Credits
Core Requirements		
EDCP610	Professional Orientation	3
EDCP611	Career Development Theory and Programs	3
EDCP668	Special Topics in Rehabilitation	3
HESI418	Special Topics in Leadership	3
Total Credits		12

Applied Counseling and Human Services (Z069)

Graduate Certificate Program
College: Education

Abstract

The Department of Counseling, Higher Education, and Special Education at the University of Maryland offers an Online Graduate Certificate in Applied Counseling and Human Services with an emphasis on Career Planning and Placement for Youth in Transition (12 credits).

Contact

For additional information see information at the Department of Counseling, Higher Education, and Special Education http://www.education.umd.edu/CHSE/academics/degree_programs/YIT.html

For specific questions, contact Dr. Debra Neubert, dneubert@umd.edu

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Website: http://www.education.umd.edu

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (1)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	30 Jul	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Applied Counseling and Human Services, Post-Baccalaureate Certificate (P.B.C.) (p. 42)

Applied Economics, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
Core Courses:		15
ECON641	Microeconomic Analysis	
ECON642	Topics in Applied Macroeconomics	
ECON643	Empirical Analysis I: Foundations of Empirical Research	
ECON644	Empirical Analysis II: Introduction to Economic Models	
ECON645	Empirical Analysis III: Econometric Modeling and Forecasting	
Select five of the following field courses:		15
ECON670	Financial Economics	
ECON671	Economics of Health Care	
ECON672	Program Analysis and Evaluation	
ECON673	Information, Game Theory and Market Design	
ECON674	Economic Analysis of Law	
ECON675	Environmental Economics	
ECON676	Economic Development	
ECON683	International Macroeconomics and Finance	
ECON684	Applied Time Series Analysis and Forecasting	
Total Credits		30

The MPEC program emphasizes quantitative applied analysis. The curriculum includes all aspects of econometric modeling (including data collection, management and analysis) and incorporates hands-on STATA exercises into instruction. Courses provide students with rigorous training in economic reasoning, and the formulation and estimation of empirical economic models, with particular emphasis on using quantitative methods to evaluate policy proposals and programs. The 10-course program includes 5 'core courses' and 5 'field courses'. The 5 core courses include 2 applied theory courses (micro and macro) and a 3-course empirical analysis sequence. The field courses allow students to apply the tools learned in the core courses to specific fields of economics and public policy analysis.

Applied Economics (off-campus) (MPEC)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The off-campus version of the Master of Professional Studies in Applied Economics program (MPEC) is a professional master's degree program designed primarilly to enhance the professional development of applied economists. The program is not designed to prepare students for PhD programs in economics. The program prepares students to work as analysts in government agencies, private firms and non-governmental organizations.

The MPEC program is an evening program with face-to-face classes in Washington, DC. The MPEC program operates on a quarter-term academic calendar. Students can complete the 10-course MPEC program in 15 months if they take 2 courses per quarter.

The MPEC program's curriculum is identical to that of the MPEM program, but the MPEM program is located on campus in College Park, and operates on the university's standard semester-based academic calendar. All credits earned at the Washington, DC location would count for the College Park program in the event that the student transfers to the College Park program. Credits earned at the University of Maryland are transferable to another institution at the sole discretion of the accepting institution.

Financial Assistance

The economics department does not offer fellowships or graduate assistantships to any of the students in the MPEC program. Domestic students in the program are eligible for the US Department of Education's Federal Unsubsidized Direct Loans and Federal Grad PLUS Loans. Some of our students also have their tuition paid, at least in part, by an employer or other 3rd party. The University's Financial Services Center provides Third Party Billing when the third party requires a bill from the university. More information about financial aid is available from the University of Maryland's Office of Student Financial Aid.

Contact

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Eileen Kramer
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Website: http://masters.econ.umd.edu

Courses: ECON

Relationships: Applied Economics (on-campus) (MPEM) (p. 44), Economic Analysis (off-campus) (Z074) (p. 164), Economic Analysis (on-campus) (Z098) (p. 165)

Admissions General Requirements

- Statement of Purpose
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (none)
- CV/Resume
- Introductory Macroeconomics course (grade of B or higher)
- Introductory Microeconomics course (grade of B or higher)
- Calculus (grade of B- or higher)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

The MPEC program offers fall and spring admission. The application deadline for fall enrollment is June 15 and the application deadline for spring enrollment is December 15.

The MPEC program cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas). The on-campus version of the program (the MPEM program) is able to sponsor international student visas. Citizens of foreign countries who currently reside in the U.S. on visas which permit them to undertake part-time study are welcome to apply to either the MPEC or the MPEM program, provided that they submit a copy of the valid visa and I-94 card.

The MPEC program's standard academic admissions requirements are: Overall GPA of at least 3.0 (on a 4-point scale), grades of at least B in introductory economics courses (micro- and macroeconomics) and a grade of at least B- in introductory calculus.

Students must upload PDF copies of their transcripts, a resume, and a brief personal statement. We do not require letters of recommendation, GRE scores or GMAT scores. Students whose prior academic degrees were all earned in non-English speaking countries must submit TOEFL or IELTS scores.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Jun	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Jun	14 Dec

Other Deadlines: Please visit the program website at http://masters.econ.umd.edu

Requirements

- Applied Economics, Master of Professional Studies (M.P.S.) (p. 43)

Facilities and Special Resources

Classes are held in the evenings in our DC classroom space, 1400 16th Street NW, # 140.

Applied Economics, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
Core Courses:		15
ECON641	Microeconomic Analysis	
ECON642	Topics in Applied Macroeconomics	
ECON643	Empirical Analysis I: Foundations of Empirical Research	
ECON644	Empirical Analysis II: Introduction to Economic Models	
ECON645	Empirical Analysis III: Econometric Modeling and Forecasting	
Select five of the following field courses:		15
ECON670	Financial Economics	
ECON671	Economics of Health Care	
ECON672	Program Analysis and Evaluation	
ECON673	Information, Game Theory and Market Design	
ECON674	Economic Analysis of Law	
ECON675	Environmental Economics	
ECON676	Economic Development	
ECON683	International Macroeconomics and Finance	
ECON684	Applied Time Series Analysis and Forecasting	
Total Credits		30

The MPEM program emphasizes quantitative applied analysis. The curriculum includes all aspects of econometric modeling (including data collection, management and analysis) and incorporates hands-on STATA exercises into instruction. Courses provide students with rigorous training in economic reasoning, and the formulation and estimation of empirical economic models, with particular emphasis on using quantitative methods to evaluate policy proposals and programs. The 10-course program includes 5 'core courses' and 5 'field courses'. The 5 core courses include 2 applied theory courses (micro and macro) and a 3-course empirical analysis sequence. The field courses allow students to apply the tools learned in the core courses to specific fields of economics and public policy analysis.

Applied Economics (on-campus) (MPEM)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The on-campus version of the Master of Professional Studies in Applied Economics program (MPEM) is a professional master's degree program designed primarily to enhance the professional development of applied economists. The program is not designed to prepare students for PhD

programs in economics. The program prepares students to work as analysts in government agencies, private firms, and non-governmental organizations.

The MPEM program is an evening program with face-to-face classes on campus in College Park. The MPEM program operates on the standard semester-based academic calendar. The standard time to completion for a full-time student is 4 semesters.

The MPEM program's curriculum is identical to that of the MPEC program, but the MPEC program is located off campus in Washington, DC and operates on a quarter-term academic calendar, rather than the traditional semester-based academic calendar.

Financial Assistance

The economics department does not offer fellowships or graduate assistantships to any of the students in the MPEM program. Domestic students in the program are eligible for the US Department of Education's Federal Unsubsidized Direct Loans and Federal Grad PLUS Loans. Some of our students also have their tuition paid, at least in part, by an employer or other 3rd parties. The University's Financial Services Center provides Third Party Billing when the third party requires a bill from the university.

After submitting their completed application, international applicants who require a student visa will be asked to complete a "Certificate of Finances" form. The form is designed to verify that international applicants have the resources necessary to finance their pursuit of our degree if they are accepted and choose to enroll.

More information about financial aid is available from the University of Maryland's Office of Student Financial Aid.

Contact

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Website: http://masters.econ.umd.edu

Courses: ECON

Relationships: Applied Economics (off-campus) (MPEC) (p. 43),Economic Analysis (off-campus) (Z074) (p. 164),Economic Analysis (on-campus) (Z098) (p. 165)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (none)
- CV/Resume
- Introductory Macroeconomics course (grade of B or higher)
- Introductory Microeconomics course (grade of B or higher)
- Calculus (grade of B- or higher)

The MPEM program offers only fall admission. Both domestic and international applicants are eligible to apply. The application deadline for international students is February 28th. The deadline for domestic applicants is June 15th.

The MPEM program's standard academic admissions requirements are: Overall GPA of at least 3.0 (on a 4-point scale), grades of at least B in introductory economics courses (micro- and macroeconomics) and a grade of at least B- in introductory calculus.

Students must upload PDF copies of their transcripts, a resume, and a brief personal statement. We do not require letters of recommendation, GRE scores or GMAT scores. Students whose prior academic degrees were all earned in non-English speaking countries must submit TOEFL or IELTS scores.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jun
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	28 Feb

Other Deadlines: Please visit the program website at http://masters.econ.umd.edu

Requirements

- Applied Economics, Master of Professional Studies (M.P.S.) (p. 44)

Facilities and Special Resources

Classes are held in the evenings on the main campus of the University of Maryland in College Park.

Applied Entomology, Master of Professional Studies (M.P.S.)

Non-thesis only (scholarly paper required): 30 credits

Course	Title	Credits
Core Requirements		
ENTM710	Insect Biodiversity, Physiology and Ecology	3
ENTM720	Native, Invasive, and Exotic Species	3
ENTM756	Insect Diseases and Pathology	3
ENTM760	Insects in the 21st Century	3
ENTM769	Capstone Course (Scholarly paper)	3
Select five Field Courses		15
Total Credits		30

Applied Entomology (MPAE)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Master of Professional Studies in Applied Entomology, a 30-credit, 10-course graduate program may be completed in as little as 15 months. Offered through the convenience and flexibility of the online learning environment, students enroll in two 3-credit courses per 12-week term.

In addition to the MPS in Applied Entomology, the Department of Entomology developed several fully online graduate certificate programs. Designed to offer flexibility to complete coursework in areas specific to your needs and interests (as well as to gain a valuable credential), successful completion of one or more of these programs may be used to fulfill requirements for the MPS. Each 12-credit program may be completed in one year by taking one 3-credit course per 12-week term.The Graduate Certificate programs are as follows:

- Graduate Certificate in Professional Studies in Beekeeping
- Graduate Certificate in Professional Studies in Integrated Pest Management (IPM)
- Graduate Certificate in Professional Studies in Organic and Sustainable Agriculture
- Graduate Certificate in Professional Studies in Urban Agriculture

Contact

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Website: http://oes-entm.umd.edu/

Relationships: Beekeeping (Z088) (p. 67), Integrated Pest Management (Z089 (p. 259)), Organic and Sustainable Agriculture (Z090) (p. 322), Urban Agriculture (Z091) (p. 421)

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (2)
- Bachelor's degree a biological field (exceptions can be made with work experience in a biological field and strong letters of recommendation)
- GPA of 3.0 or higher (expectations can be made with work experience in a biological field and strong letters of recommendation)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For complete Admission Information, please visit: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-applied-entomology/apply

UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS).Additional requirements can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-applied-entomology/apply#International

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	22 Feb
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://oes-entm.umd.edu/

Requirements

- Applied Entomology, Master of Professional Studies (M.P.S.) (p. 46)

Applied Mathematics & Statistics, and Scientific Computation, Master of Science (M.S.)

Students must complete 30 credits of coursework in one of the three areas of concentration. All three concentrations offer both thesis and non-thesis options.

Students choose from one of the following concentrations:

APPLIED MATHEMATICS

Thesis option requires 24 credits of coursework including 12 credits at the 600-800 level, 12 credits in courses with primarily math content, three credits in Numerical Analysis, one credit of Applied Math or appropriate seminar, and six credits in an application area. Students are also required to complete six credits of AMSC799.

Non-thesis option requires 30 credits of coursework including 18 credits at the 600-800 level, 15 credits with primarily math content, three credits in Numerical Analysis, six credits in an application area, and one credit of Applied Math or appropriate seminar. Students are also required to submit a scholarly paper, and pass the master's level Qualifying Exam Requirement.

Applied Statistics

Thesis option requires 24 credits of coursework including 18 credits of statistics core courses, six credits in an application area, and one credit of seminar. Students are also required to complete six credits of AMSC799.

Non-thesis option requires 30 credits of coursework including 18 credits of statistics core courses, six credits in an application area, six credits of electives, two credits of seminar, and one credit of AMSC762. Students are also required to pass three qualifying exams, and submit a scholarly paper.

Scientific Computation

Thesis option requires 24 credits of coursework including nine credits of scientific computing core courses, six credits of core science courses, and three credits of scientific computing application courses. Students must also complete six credits of AMSC799.

Non-thesis option requires 30 credits of coursework including 15 credits of scientific computing core courses, six credits of core science courses, three credits of scientific computing application courses, and six credits of electives. Students must also submit a scholarly paper.

Applied Mathematics & Statistics, and Scientific Computation, Doctor of Philosophy (Ph.D.)

Doctoral students must fulfill the coursework requirement of the corresponding concentration and/or pass a set of comprehensive written examinations at the Ph.D. level. In addition, the student must pass the Oral Candidacy Examination, which tests the student on advanced material to determine if he or she is prepared to do the research for a doctoral dissertation.

Details on the level and distribution of coursework and examinations in mathematics and in the applications area are given on the program web site: http://www.amsc.umd.edu/programs/index.html

Students choose from one of the following concentrations:

Applied Mathematics

Students are required to complete 18 credits of courses with mathematical content with at least nine credits at the 600-898 level, and three credits in Numerical Analysis. Additional course requirements include six credits in an application area, nine credits of electives, two credits of approved seminars, and 12 credits of AMSC899

Course	Title	Credits
Core Requirements		
Select 18 credits of courses with mathematical content with at least nine credits at the 600-898 level and three credits in Numerical Analysis		18
Select six credits in an application area		6
Select nine credits of electives		9
Select two credits of approved seminars		2
Dissertation Research Requirements		
AMSC899	Doctoral Dissertation Research	12
Total Credits		47

Applied Statistics

Students are required to complete 18 credits of statistics core courses, six credits of application courses, three credits of electives, three credits of AMSC760, two approved seminar or RIT courses, a one credit data project, and 12 credits of AMSC899.

Course	Title	Credits
Core Courses		
Select 18 credits of statistics core courses		18
Select six credits of application courses		6
Select three credits of electives		3
AMSC760	Applied Statistics Practicum	3
Select two approved seminar or RIT courses		2
Select a one credit data project		1
Dissertation Research Requirements		
AMSC899	Doctoral Dissertation Research	12
Total Credits		45

Scientific Computation

Students are required to complete 15 credits of scientific computing core courses, six credits of core science courses, six credits of scientific computing application courses, nine credits of electives, and 12 credits of AMSC899.

Course	Title	Credits
Core Courses		
Select 15 credits of scientific computing core courses		15
Select six credits of core science courses		6
Select six credits of scientific computing application courses		6
Select nine credits of electives		9
Dissertation Research Requirements		
AMSC899	Doctoral Dissertation Research	12
Total Credits		48

Applied Mathematics & Statistics, and Scientific Computation (AMSC)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The interdisciplinary program in Applied Mathematics & Statistics, and Scientific Computation (AMSC) offers graduate study leading to Master of Science and Doctor of Philosophy degrees with concentrations in applied mathematics, applied statistics, and scientific computation. It also offers a Certificate in Scientific Computation to graduate students enrolled in other university Ph.D. programs. The faculty is drawn from departments throughout the university. Possible areas of application include the physical, chemical, biological, and social sciences, and engineering. The program receives substantial support from the Department of Mathematics (MATH), the Center for Scientific Computation and Mathematical Modeling (CSCAMM), and the Institute for Physical Science and Technology (IPST). AMSC offers a spectrum of courses at the forefront of computation and applications, as well as state-of-the-art computational, visualization and networking facilities.

The Concentration in Applied Mathematics trains individuals who are able to enhance their understanding of a wide spectrum of scientific phenomena through the application of rigorous mathematical analysis. At least half of the required work is expected to be in courses with primarily mathematical content; the remaining courses must apply to a field outside of the usual mathematics curriculum in the student's chosen area of application. Graduate students currently pursue studies in the applications areas such as meteorology, fluid dynamics, algorithm development, pattern recognition, operations research, mathematical finance, computational dynamics, structural mechanics, mathematical biology, and systems and control theory. Other areas of study are available through participating departments. All students must include numerical analysis or scientific computing courses in their program of study.

The Concentration in Applied Statistics emphasizes acquisition of advanced training in the area of statistical application along with statistical topics and development of mathematical and computing skills necessary for the modern applied statistician. Students are required to take a series of core statistical and computational courses with more emphasis on data analytics and presentation skills. In addition, students will take a minimum of six credits in an outside application area.

The Concentration in Scientific Computation emphasizes the application of computation to the physical sciences, life sciences, engineering, business, and social sciences. Students will receive training in the use of computational techniques and technology with correspondingly less emphasis on formal mathematical methods in comparison to the Concentration in Applied Mathematics. Every Scientific Computation student is required to apply the training in computation to a problem in a specific scientific discipline.

A master's degree program in all concentrations with an emphasis on numerical analysis, computational methods, probability and statistics is excellent preparation for industrial or government employment.

Financial Assistance

The program offers teaching assistantships in the Department of Mathematics as a source of support for graduate students. These assistantships carry a stipend with remission of tuition of up to 10 credit hours each semester. Research assistantships are also available through participating departments and other sources, especially for students that have acquired advanced training. Assistantships are usually available only to incoming Ph.D. students; applications including letters of recommendation should be completed by January 10 for full consideration.

Contact

For more specific information, visit the program FAQ or email amsc@amsc.umd.edu.

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Website: http://www.amsc.umd.edu

Courses: AMSC

Keywords: Interdisciplinary program in applied mathematics, statistics and scientific computation that includes over 25 departments, including: Math, Engineering, Physics, Meteorology, Computer Science, Operations Research, Economics, and Biology.

Relationships: Aerospace Engineering (ENAE) (p. 26), Animal Sciences (ANSC) (p. 36), Astronomy (ASTR) (p. 61), Atmospheric and Oceanic Science (AOSC) (p. 64), Biological Sciences (BISI) (p. 81), Business and Management (BPHD) (p. 107), Chemical Engineering (ENCH) (p. 112), Civil and Environmental Engineering (ENCE) (p. 118), Computer Science (CMSC) (p. 138), Economics (ECON) (p. 166), Electrical and Computer Engineering (ENEE) (p. 168), Geology (GEOL) (p. 216), Government and Politics (GVPT) (p. 228), Mechanical Engineering (ENME) (p. 300), Physics (PHYS) (p. 326)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations
- GRE Subject (strongly recommended/not required)
- Advanced Textbooks: Textbooks of Advanced Technical Courses taken are to be submitted in the Advanced Textbooks section of online application. Please see the AMSC website for further details.

In addition to the Graduate School requirements, applicants are required to take the GRE general examination. The applicants are encouraged to take the GRE subject examination in either mathematics or another scientific topic. Applicants should have at least a "B" average (3.0 on a 4.0 scale) and should have completed an undergraduate program of study that includes a strong emphasis on rigorous mathematics, preferably through the level of advanced calculus and linear algebra.

Admission will be based on the applicant's ability to do graduate work in either applied mathematics, applied statistics, or scientific computation as demonstrated by the letters of recommendation, grades in coursework, and program of study. In some circumstances, a provisional admission may be given to applicants whose mathematical training is not sufficiently advanced. Previous education in an application area such as physics, biology, economics or one of the engineering disciplines, and a basic competence in computational techniques will be favorably considered in a student's application, although this is not a prerequisite.

When a student has decided upon an area of specialization, an advisory committee is formed and approved by the AMSC Graduate Committee. The advisory committee is responsible for formulating with the student a course of study that leads toward the degree sought. This course of study must constitute a unified, coherent program in an acceptable field of specialization of applied mathematics, applied statistics, or scientific computation.

For more admissions information, please visit http://www.amsc.umd.edu/join_us/index.html

To apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	10 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	10 Jan

Other Deadlines: Please visit the program website at http://www.amsc.umd.edu

Requirements

- Applied Mathematics & Statistics, and Scientific Computation, Doctor of Philosophy (Ph.D.) (p. 47)
- Applied Mathematics & Statistics, and Scientific Computation, Master of Science (M.S.) (p. 47)

Facilities and Special Resources

There are over 25 participating departments and institutes on the College Park campus, including units in the College of Computer, Mathematical, and Natural Sciences and the School of Engineering. The university has an engineering technical library as well as a network of high performance workstations for faculty and graduate students. In addition, there are collaborations with various area research institutes such as NASA Goddard Space Flight Center, National Institutes of Health, National Institute of Standards and Technology, Naval Research Laboratory, and National Oceanic and Atmospheric Administration.

Architecture, Master of Architecture (M.Arch.)

Path A: Advanced Standing Professional Degree Program

Course	Title	Credits
Core Requirements		
ARCH460	Site Analysis and Design	3
ARCH700	Urban Design Studio VII	6
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH Seminar		3
Electives		15
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH770	Professional Practice of Architecture	3
ARCH799	Master's Thesis Research	6
Total Credits		60

Path B: For students with a Baccalaureate outside of Architecture

Course	Title	Credits
Core Requirements		
ARCH404	Graduate Architecture Design Studio I	6
ARCH443	Visual Communication For Architects	3
ARCH405	Graduate Architecture Design Studio II	6
ARCH445	Visual Analysis of Architecture	3
ARCH406	Graduate Architecture Design Studio III	6
ARCH466	Environmental Systems in Architecture	3
ARCH407	Graduate Architecture Design IV	6
ARCH460	Site Analysis and Design	3

ARCH611	Advanced Architecture Technology Seminar	3
ARCH770	Professional Practice of Architecture	3
ARCH Seminars		6
ARCH798	Thesis in Architecture	3
ARCH462	Methods & Materials of Building Construction	3
ARCH426	History of Architecture II	3
ARCH463	Sustainable Systems in Architecture	3
ARCH425	History of Architecture I	3
ARCH464	Architectural Structures I	3
ARCH601	Topical Design Studio VI	6
ARCH465	Architectural Structures II	3
ARCH600	Integrated Design Studio V	6
ARCH654	Urban Development and Design Theory	3
ARCH797	Thesis Proseminar	3
Electives		12
ARCH799	Master's Thesis Research	6
Total Credits		105

Students entering the program with a four-year Bachelor of Science degree in Architecture from an accredited college or university normally require two years of graduate study to complete the requirements for the professional Master of Architecture degree. The established curriculum requires four semesters of academic work encompassing a total of 60 credits. Additional credits may be required depending upon the admissions committee's evaluation of the individual's academic and architectural experience. Information on required courses and curriculum may be obtained from the School of Architecture, Planning and Preservation website at http://www.arch.umd.edu.

Students who enter the professional program with a B.A. or B.S. in a discipline other than architecture will normally require seven semesters of design studio and other prerequisite courses encompassing a total of 105 credits. Students may be granted advanced standing if they have completed the appropriate prerequisites. Information on required courses and curriculum may be obtained from the School of Architecture, Planning and Preservation website at http://www.arch.umd.edu.

A Graduate Certificate in Historic Preservation (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?Z005) is available to M. Arch and M.S. in Arch candidates. The course of study includes 16 credits of required courses.

A Graduate Certificate in Urban Design (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?Z012) is available to M. Arch and M.S. in Arch candidates. The course of study includes 15 credits of required courses.

Architecture, Master of Science (M.S.)

Thesis only: 30 credits

Course	Title	Credits
Core Requirements		
ARCH700	Urban Design Studio VII	6
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
ARCH Elective		3
Electives		9
Total Credits		30

A special option leading to the Master of Science in Architecture degree is available for those students who already possess an accredited NAAB professional degree in architecture (B.Arch. or M. Arch.) or its foreign equivalent. This option is designed to accommodate the needs of students who wish to do advanced work beyond that required for the professional degree. Applicants must specify in detail the nature of the proposed course of study for review and approval by the admissions committee prior to their admission. The School currently provides resources for advanced work in architectural design and urban design.

Architecture (ARCH)

Graduate Degree Program
College: Architecture

Abstract

The School of Architecture, Planning and Preservation offers a graduate program leading to the National Architectural Accrediting Board (NAAB) accredited Master of Architecture degree. The Architecture Program (ARCH) seeks to change the world through innovative architectural and urban design pedagogies, research, and practice that transforms place at all scales and improves the quality of life. In the course of our mission, we instigate change through teaching, experience, and scholarly activity, which prepares the next generation of broadly educated, highly-skilled architects and designers to be problem seekers/solvers in collaborative learning and professional environments. The Program offers a rich and demanding mix of architectural and urban design studios, architectural history and theory, and architectural science and technology. Electives in architecture and related fields are available in the curriculum.

NAAB Required Statement on Accreditation:

In the United States, most registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit professional degree programs in architecture offered by institutions with U.S. regional accreditation, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted an eight-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may require a pre-professional undergraduate degree in architecture for admission. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

The University of Maryland School of Architecture, Planning & Preservation offers NAAB-accredited degree programs:

- M.Arch (pre-professional degree + 60 graduate credits)
- M.Arch (non-pre-professional degree + 105 credits)

Next accreditation visit for both programs: 2017

The School is a member of the Association of Collegiate Schools of Architecture (ACSA) and the Architectural Research Centers Consortium (ARCC).

Financial Assistance

The School of Architecture, Planning, and Preservation offers a limited and varying number of teaching and research assistantships, scholarships, fellowships, and internships. Applicants should apply for financial assistance when submitting the application for admission.

Contact

Find additional information on program offerings, degree requirements, admissions, and financial aid on the School's Website (www.arch.umd.edu). Schedule a visit and tour online at: http://arch.umd.edu/arch/prospective-students-arch. Sign up to receive an invitation to our Graduate Open House and receive more information online at: http://arch.umd.edu/mapp/graduate-inquiry-form.

For further information on admissions and degree requirements, please contact Brian Kelly, AIA, Architecture Program Director, archadvise@umd.edu, 301-405-8000.

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Courses: ARCH HISP RDEV URSP

Relationships: Historic Preservation (HISP) (p. 238), Real Estate Development (RDEV) (p. 351), Urban and Regional Planning and Design (URPD) (p. 422)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Portfolio (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationportfoliorequirementsarchardvarhparcp.pdf)

Admission to the graduate program is competitive. In addition to the Graduate School requirements, candidates must submit a portfolio. The portfolio should show evidence of creative ability in the form of a portfolio containing reproductions of creative work, which may include drawings, paintings, photographs, sculpture, sketches, and/or architectural designs. Details concerning format and content may be obtained from the School of Architecture, Planning and Preservation website

Applications from four categories will be considered for admission:

1. candidates with a four-year Bachelor of Science in architecture degree;
2. candidates with four-year baccalaureate (B.A.) in architecture, environmental design (B.A. or B.S.), or relevant discipline; and
3. candidates with four-year baccalaureate (B.A. or B.S.) in a major other than architecture who have successfully completed specified undergraduate prerequisites outlined by the School of Architecture, Planning, and Preservation[1]; and
4. candidates with an accredited professional degree in architecture. Students are expected to enroll on a full-time basis. For complete information on curricula requirements for these categories, visit the School of Architecture, Planning and Preservation website (http://www.arch.umd.edu.).

[1] Additional requirements include:
- one (1) semester of college level calculus or successful high school advanced placement (AP) calculus; and
- one (1) semester of college level physics with lab, or successful high school advanced placement (AP) in physics
- One (1) course in freehand figurative drawing is recommended but not required.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Architecture, Master of Architecture (M.Arch.) (p. 49)
- Architecture, Master of Science (M.S.) (p. 50)

Facilities and Special Resources

The School of Architecture, Planning, and Preservation is ideally located between Washington, DC, and Baltimore and surrounded by a number of historic communities and a varied physical environment. The resulting opportunity for environmental design study is unsurpassed. The School's resources include design workstations for each student, a model shop, a digital fabrication lab, and computer labs. The School's library contains some 57,000 monographs and 6,000 current periodicals, making it one of the major architectural libraries in the nation. The National Trust Library for Historic Preservation, housed in McKeldin Library, contains

11,000 volumes and 450 periodical titles. The slide collection includes approximately 430,000 slides on architecture, landscape architecture, planning, and technical subjects. The interdisciplinary National Center for Smart Growth Education and Research is based in the School offering perspectives and opportunities to engage important issues facing urban and regional planning.

The Architecture Program benefits from the strong support of the professional community, including practitioners who bring expertise into the architectural design studios as instructors, consultants, and critics. Many alumni are leaders in regional firms, while others practice as far away as New York, Los Angeles, Puerto Rico, Vancouver, London, and Shanghai.

The University of Maryland's team has won the ULI/Hines Competition several times, with each member of the team being awarded $10,000.

The award-winning Comprehensive Design Studio and Advanced Technology sequence (an integral component of the M. Arch curriculum) offers an innovative teaching-learning environment where students work with an array of consultants from practice, exploring relationships between conceptual and technical aspects of architectural form and its assembly.

Embracing the importance of context as an integral component of the design process and advocating urban design as an essential component of architectural education, the Program has gained national and international recognition for its work in urban design, through awards and competition performance. Interdisciplinary competitions like the Urban Land Institute (ULI) Hines Urban Design Competition give architecture students opportunities to team up with fellow graduate students in planning, historic preservation, and real estate development to address urban issues in a work environment that prepares them for the collaborative experience of professional practice. In both 2014 and 2015 the University of Maryland's ULI-Hines competition team took first place in international competition bringing back over $50,000 in scholarship monies each time. The Urban Design Studio explores relationships between individual buildings, urban spaces, and the contexts in which they reside. Studios engage projects ranging from conceptual urban interventions to projects that help communities to envision future growth.

Study abroad opportunities augment the course of study offered in College Park. Summer and Winter study abroad programs are offered to a variety of locations including Rome, Paris, Scandinavia, Great Britain, Turkey, St. Petersburg, Egypt, Peru, and Sri Lanka. Summer and winter study opportunities are also available in conjunction with the Historic Preservation, Urban Studies & Planning, and Real Estate Development programs. A Spring Semester study abroad program is available in Florence.

Architecture and Community Planning, Master of Architecture and Master of Community Planning (dual degree) (M.Arch. and M.C.P.)

Path A: Advanced Standing for Students with a B.S. (75 or 78 credits)

Course	Title	Credits
Core Requirements		
ARCH460	Site Analysis and Design	3
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH 6xx	Architecture Elective	3
ARCH700	Urban Design Studio VII	6
ARCH 6xx	Architecture Elective	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH799	Master's Thesis Research	6
ARCH798	Thesis in Architecture	3
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP xxx	Elective Social Requirement	3
URSP705	Summer Community Planning Studio I	4
URSP706	Summer Community Planning Studio II	2
URSP709	Field Instruction	0-3
Total Credits		75-78

Path B: For Individuals with a B.A. or B.S. (126 or 129 credits)

Course	Title	Credits
Core Requirements		
ARCH404	Graduate Architecture Design Studio I	6
ARCH405	Graduate Architecture Design Studio II	6
ARCH406	Graduate Architecture Design Studio III	6
ARCH407	Graduate Architecture Design IV	6
ARCH425	History of Architecture I	3
ARCH426	History of Architecture II	3
ARCH443	Visual Communication For Architects	3
ARCH445	Visual Analysis of Architecture	3
ARCH460	Site Analysis and Design	3
ARCH462	Methods & Materials of Building Construction	3
ARCH463	Sustainable Systems in Architecture	3
ARCH464	Architectural Structures I	3
ARCH465	Architectural Structures II	3
ARCH466	Environmental Systems in Architecture	3
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
ARCH 6xx	Architecture Elective	3
ARCH 6xx	Architecture Elective	3
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	6

URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP688L		3
URSP xxx	Elective Social Requirement	3
URSP606	Planning Economics	3
URSP709	Field Instruction	0-3
URSP708	Community Planning Studio [1]	6
Total Credits		126-129

[1] Community Planning Studio is also offered in the summer as URSP705 and URSP706

Architecture and Community Planning (ARCP)

Graduate Certificate Program
College: Architecture

Abstract

The dual degree combines course work from the Architecture and Urban Studies and Planning programs to enable a student to complete both the Master of Architecture (http://arch.umd.edu/arch/degree/master-architecture) and Master of Community Planning (http://arch.umd.edu/ursp/degree/master-community-planning) degrees with fewer credits than it would take to complete the two separately.

Students of the dual-degree program acquire specialized knowledge tailored to understanding the urban environment from several perspectives. Students learn how social, economic and political forces have led to the development of human habitats. The emphasis on urban design in the dual-degree program yields an education that is particularly applicable for persons interested in the revitalization of metropolitan areas and their center cities.

Applicants for the dual degree in Architecture and Community Planning should use the following four-letter code on the online application: ARCP

Contact

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Website: http://www.arch.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Portfolio (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationportfoliorequirementsarchardvarhparcp.pdf)
- Must be admitted by both programs to pursue dual degree

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Architecture and Community Planning, Master of Architecture and Master of Community Planning (dual degree) (M.Arch. and M.C.P.) (p. 52)

Architecture and Historic Preservation,Master of Architecture and Master of Historic Preservation (dual degree) (M.Arch. and M.H.P.)

Path A: Advanced Standing Professional Degree Program

Course	Title	Credits
Core Requirements		
ARCH600	Integrated Design Studio V	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH601	Topical Design Studio VI	6
ARCH460	Site Analysis and Design	3

ARCH xxx	Architectural History Elective	3
ARCH700	Urban Design Studio VII	6
ARCH xxx	Elective	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
HISP600	History, Theory, and Practice of Historic Preservation	3
RDEV670	Negotiating Agreements & Resolving Conflicts when Developing Real Property	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP650	Historic Preservation Studio Workshop	6
HISP655	American Vernacular Architecture	3
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
Internship (Internship in Historic Preservation)		0
Total Credits		75

Path B: For Students with a Baccalaureate outside of Architecture

Course	Title	Credits
Core Requirements		
ARCH404	Graduate Architecture Design Studio I	6
ARCH405	Graduate Architecture Design Studio II	6
ARCH406	Graduate Architecture Design Studio III	6
ARCH407	Graduate Architecture Design IV	6
ARCH425	History of Architecture I	3
ARCH426	History of Architecture II	3
ARCH443	Visual Communication For Architects	3
ARCH445	Visual Analysis of Architecture	3
ARCH460	Site Analysis and Design	3
ARCH462	Methods & Materials of Building Construction	3
ARCH463	Sustainable Systems in Architecture	3
ARCH464	Architectural Structures I	3
ARCH465	Architectural Structures II	3
ARCH466	Environmental Systems in Architecture	3
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
ARCH 6xx	Architecture Elective	3
ARCH 6xx	Architecture Seminar	3
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP650	Historic Preservation Studio Workshop	6
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP690	(Preservation Management and Practice)	2
Internship (Internship in Historic Preservation)		0
Total Credits		126

The dual degree combines course work from the Architecture and Historic Preservation programs to enable a student to complete both the Master of Architecture and Master of Historic Preservation degrees with fewer credits than it would take to complete the two separately.

Architecture and Historic Preservation (ARHP)

Graduate Certificate Program
College: Architecture

Contact

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Fax: 301.314.9583
Email: dwline@umd.edu

Website: http://www.arch.umd.edu

Admissions

General Requirements

- Statement of Purpose: In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Portfolio (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationportfoliorequirementsarchardvarhparcp.pdf)
- Writing Sample of at least 10-30 pages. This can be previous individual academic or professional work. It does not necessarily have to be related to architecture and historic preservation, however a related topic is preferred. The writing sample should demonstrate the ability to analyze a problem/question and clearly communicate your findings. Upload to the *Writing Sample* of the *Uploads Requirements* section of the online application.
- Must be admitted by both programs to pursue dual degree

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Architecture and Historic Preservation,Master of Architecture and Master of Historic Preservation (dual degree) (M.Arch. and M.H.P.) (p. 53)

Architecture and Real Estate Development, Master of Architecture and Master of Real Estate Development (dual degree) (M.Arch. and M.R.E.D.)

Path A: Advanced Standing for Students with a Pre-Professional Degree in Architecture

Course	Title	Credits
Core Requirements		
ARCH600	Integrated Design Studio V	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH601	Topical Design Studio VI	6
ARCH460	Site Analysis and Design	3
ARCH xxx	Architecture Elective	3
ARCH700	Urban Design Studio VII	6
ARCH797	Thesis Proseminar	3
ARCH770	Professional Practice of Architecture	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
RDEV600	Principles and Practice of Real Property Development	3
RDEV603	Introduction to Real Property Finance	3
RDEV630	Real Property Finance and Investment	3
RDEV610	Real Property Development Law and Ethics	3
RDEV690	Capstone Project: Real Property Feasibility Study	3
Cognate Courses		15
Total Credits		75

Path B: For Students with a Baccalaureate outside of Architecture

Course	Title	Credits
Core Requirements		
ARCH404	Graduate Architecture Design Studio I	6
ARCH405	Graduate Architecture Design Studio II	6
ARCH406	Graduate Architecture Design Studio III	6
ARCH407	Graduate Architecture Design IV	6
ARCH425	History of Architecture I	3
ARCH426	History of Architecture II	3
ARCH443	Visual Communication For Architects	3
ARCH445	Visual Analysis of Architecture	3
ARCH460	Site Analysis and Design	3
ARCH462	Methods & Materials of Building Construction	3
ARCH463	Sustainable Systems in Architecture	3
ARCH464	Architectural Structures I	3
ARCH465	Architectural Structures II	3
ARCH466	Environmental Systems in Architecture	3
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
RDEV630	Real Property Finance and Investment	3
Architecture Elective		3
Architecture Seminar		3
RDEV600	Principles and Practice of Real Property Development	3
RDEV603	Introduction to Real Property Finance	3
RDEV610	Real Property Development Law and Ethics	3
RDEV690	Capstone Project: Real Property Feasibility Study	3
Real Estate Development Elective		3
Cognate Courses		15
Total Credits		126

Students entering the program with a four-year Bachelor of Science degree in Architecture from an accredited college or university normally require two years of graduate study to complete the requirements for the professional Master of Architecture degree (Path A). The dual degree curriculum requires 75 credits which can be completed in five semesters plus one Summer and one Winter term course. Additional credits may be required depending upon the architectural admissions committee's evaluation of the individual's academic and architectural experience. Information on required courses and curriculum may be found on the School of Architecture, Planning, and Preservation website at http://www.arch.umd.edu.

Students who enter the professional program with a B.A. or B.S. in a discipline other than architecture (Path B) will normally require eight semesters plus course work in 2 summer and two winter terms in order to complete the 126 credits required for the dual degree in architecture and real estate development. Students may be granted advanced standing if they have completed certain of the required architecture prerequisites. Information on required courses and curriculum may be found on the School of Architecture, Planning, and Preservation website at http://www.arch.umd.edu.

Architecture and Real Estate Development (ARDV)

Graduate Degree Program
College: Architecture

Abstract

There are several paths, depending on prior education and experience for applicants to consider for Architecture as well as for Real Estate Development. Students applying for the dual degree program will complete fewer courses (permitted overlap of courses) than if they took each degree program separately. The total number of credits for the dual degree is 75 credits for Path A architecture/real estate development dual degree students (those with undergraduate degree credits fully accepted) and is 127 credits for Path B architecture/real estate development dual degree students (those without an undergraduate degree in architecture). For the most complete information on the architecture program, also consult the catalog entry for ARCH. For the most complete information on the real estate development program, also consult the catalog entry for RDEV.

Financial Assistance

The School of Architecture, Planning, and Preservation offers a limited and varying number of teaching and research assistantships, scholarships, fellowships, and internships. Applicants should apply for financial assistance when submitting the application for admission.

The Colvin Institute provides scholarship funds to a number of highly qualified students, who may be dual degree students each term. Scholarship determinations are made at the time of application and admission. Scholarships are generally awarded on a per course basis and commitments are made at the time of admission and apply to the entire program, subject to academic performance. Periodically there are named scholarships provided by various real estate organizations or development companies.

In addition, there are work opportunities both on, and off campus, and they are relatively plentiful. However, students in the dual degree program may find it impossible to complete their degree requirements timely if they are working off campus, or more than 10 hours per week. However, the MRED student listserv posts openings periodically as they are brought to the attention of the Program by alumni, friends, faculty and sponsors.

Applicants should inquire as to the availability of funding for the term they are starting. Colvin Institute scholarships are typically for a portion of tuition only, and are paid on a per course basis as students progress through the program.

Contact

Find additional information on program offerings, degree requirements, admissions, and financial aid on the School's Web site (www.arch.umd.edu).

Schedule a visit and tour online at: http://arch.umd.edu/arch/prospective-students-arch. Be sure to contact the Program Director for Real Estate Development, Maria Day-Marshall, (mdaymars@umd.edu) if you wish to attend a sampling of RDEV classes while here.

Sign up to receive an invitation to our Graduate Open House online at: http://arch.umd.edu/mapp/graduate-inquiry-form

For further information about the Architecture Program, please contact Brian Kelly, AIA, Director, archadvise@umd.edu, 301.405.8000.

For further information about the Real Estate Development Program and the Colvin Institute, please contact Maria Day-Marshall, JD, LLM, Director, mdaymars@umd.edu, 301.405.8000.

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Website: http://www.arch.umd.edu

Relationships: Historic Preservation (HISP) (p. 238)

Admissions
General Requirements

- Statement of Purpose: In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.

- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Portfolio (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationportfoliorequirementsarchardvarhparcp.pdf)
- Writing Sample of 3-5 pages in business style writing related to real estate. This can be previous individual academic or professional work. Any confidential information should be redacted.
- Skills Assessment (in the online application)
- Must be admitted by both programs to pursue dual degree.

The application process consists of the following:

- First, fill out the online application for the University of Maryland Graduate School. The administrative code for the dual degree in Master of Architecture degree and Master of Real Estate Development is "ARDV."
- Second, submit all transcripts, three professional letters of recommendation, statement of purpose, resume, official test scores, portfolio, and writing sample as part of the application.

All applicants must have a bachelor's degree from an accredited institution. There is no restriction on the applicant's previous field of study, and indeed we encourage diversity in all senses.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas;A,E,G,H,I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Architecture and Real Estate Development, Master of Architecture and Master of Real Estate Development (dual degree) (M.Arch. and M.R.E.D.) (p. 55)

Facilities and Special Resources

The School of Architecture, Planning and Preservation and the Colvin Institute of Real Estate Development are ideally located between Washington, DC, and Baltimore and surrounded by a number of historic communities and a varied physical environment. The resulting opportunity for real estate development and environmental design study is unsurpassed.

The School's resources include design workstations for each architecture student, a model shop, a digital fabrication lab, and both PC and MAC computer labs with REVIT, ARGUS, GIS, Maptitude and other design programs available. The School's library contains some 57,000 monographs and 6,000 current periodicals, making it one of the major architectural libraries in the nation. The National Trust Library for Historic Preservation, housed in McKeldin Library, contains 11,000 volumes and 450 periodical titles. The Colvin Institute holds the entire library offerings of the Urban Land Institute and access to all the case studies published by ULI. The interdisciplinary National Center for Smart Growth Research and Education, based in the School, offers perspectives and opportunities to engage important issues facing urban and regional planning.

Both the Real Estate Development and Architecture Programs benefit from the strong support of the professional community, including practitioners who bring expertise into the architectural design studios as instructors, consultants, and critics. The RDEV courses are all taught by working or retired real estate professionals giving unparalleled access for students to make connections with current practice in the industry. Many architecture alumni are leaders in regional firms, while others practice as far away as New York, Los Angeles, Puerto Rico, Vancouver, London, and Shanghai.

The ULI Hines competition is open to graduate students who are pursuing real estate-related studies at universities in the United States and Canada, including programs in real estate development, urban planning, urban design, architecture and landscape architecture. In the past six years, the University of Maryland has reached the ULI Hines finals four times, won twice (2014 & 2015) and received one honorable mention.

The award-winning Comprehensive Design Studio and Advanced Technology sequence (an integral component of the M. Arch curriculum) offers an innovative teaching-learning environment where students work with an array of consultants, exploring relationships between conceptual and technical aspects of architectural form and its assembly.

Embracing the importance of context as an integral component of the design process and advocating urban design as an essential component of architectural education, the Program has gained national and international recognition for its work in urban design, through awards and competition performance. Dual degree students are prime candidates for selection to participate in the interdisciplinary competitions supported by the School, including the national ULI Hines, the regional REIDO development competition, and the local capital area competition sponsored by NAIOP which gives the team the opportunity to present a urban (re)development solution to a large professional audience of real estate and design professions.

Study abroad opportunities augment the course of study offered in College Park. Summer study abroad programs are offered to a variety of locations including Rome, Paris, Scandinavia, Great Britain, Turkey, St. Petersburg, Egypt, Peru, and Sri Lanka. Summer and winter study opportunities are also available in conjunction with the Historic Preservation, Urban Studies & Planning, and Real Estate Development programs. A Spring Semester study abroad program is based at Kiplin Hall in Great Britain.

Dual degree students have the option to do their M.Arch thesis and MRED Capstone project in a combined fashion, with a design and development proposition supported by a committee of design and development instructors and professional advisors. These are very challenging and

rewarding for students and faculty alike, but require a fair amount of advance planning on the part of both the student and faculty.

Art History and Archaeology, Master of Arts (M.A.)

Thesis only: 30 credits

Course	Title	Credits
Core Requirements		
ARTH692	Methods of Art History	3
ARTH799	Master's Thesis Research	6
Select seven graduate colloquia or seminars (3 credits each) including one course from each of the following four topic areas: [1]		21
Art before 1800 (Chronological area)		
Art after 1800 (Chronological area)		
Art outside Europe and the USA (Geographical area)		
Art from Europe and/or the USA (Geographical area)		
Total Credits		30

[1] A single course may fulfill one of the chronological areas as well as one of the geographic areas. No one course, however, can fulfill both of the chronological topic areas or both of the geographic areas.

For the Master's degree, the student will: complete 30 credit hours at the 600 and 700 levels (at least 9 of these credits must be 700 level seminars; 6 are for thesis research; and one course must be ARTH692; pass the departmental language examination in French or German, or in a language appropriate to the area studied (such as Japanese); complete a thesis that demonstrates competency in research and in original investigation; and successfully defend the thesis. Please consult the department's web site for information regarding course distributional requirements. A minimum grade of “B-” is required for all courses approved for graduate credit. Two grades below “B-” result in automatic dismissal from the program.

Art History and Archaeology, Doctor of Philosophy (Ph.D.)

Requirements after the M.A. Degree

Course	Title	Credits
Core Requirements		
Select 18 credits of coursework		18
ARTH692	Methods of Art History (if not previously taken)	3
Dissertation Research Requirements		
ARTH899	Doctoral Dissertation Research	12
Total Credits		33

Requirements for Students Who Bypass the M.A. and Enter Directly into the Doctoral Program

Course	Title	Credits
Core Requirements		
Select 42 credits of coursework [1]		42
ARTH692	Methods of Art History	3
Dissertation Research Requirements		
ARTH899	Doctoral Dissertation Research	12
Total Credits		57

[1] For coursework distributional requirements, please see the M.A. core requirements.

All doctoral students must pass two foreign language exams (one of these could have been taken as an M.A. student), submit a successful request for approval of doctoral exam topics, pass both the written and oral doctoral exams, successfully defend a dissertation proposal, and successfully defend a dissertation.

A total of thirty-three credit hours, after the M.A. degree, is required for the Ph.D. program. This involves seven courses (21 credit hours), including Methods of Research (ARTH692) if not previously taken; the final twelve credit hours will be Dissertation Research (ARTH899). For the direct Ph.D.–in which the M.A. degree is bypassed–the student must complete a total of fifty-seven credit hours, including Methods of Research (ARTH692) and fourteen other courses; the final twelve credit hours will be Dissertation Research (ARTH899). For coursework distributional requirements, see the department's web page. A minimum grade of "B-" is required for all courses approved for graduate credit. Two grades below "B-" result in dismissal from the program.

Art History and Archaeology (ARTH)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of Art History and Archaeology offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees in Art History. The Program is committed to the advanced study and scholarly interpretation of works of art from the prehistoric era to the present and is grounded in the concept of art as a humanistic experience. The faculty offers expertise in all phases of the history of Western art as well as the arts of Africa, the Americas, and East Asia.

Financial Assistance

Fellowships are awarded on the basis of merit by the College of Arts and Humanities and by the Graduate School. Several graduate assistantships are awarded by the Department. Also, up to four Museum Fellowships are awarded each year by the Department of Art History and Archaeology for research at major museums in the Washington-Baltimore area. In honor of its late founding chairman, the Department has established the George Levitine Art History Endowment, in support of research activities of graduate students as well as faculty. The Jenny Rhee Fellowship supports research, travel, and other educational expenses. The Department has recently received a generous gift from the Robert H. Smith family which includes three graduate fellowships. Additional fellowships are available, including travel and dissertation research awards.

Contact

For more information on Departmental requirements and any other information, please view the Department’s website, or contact the Department's Director of Graduate Studies or Coordinator of Graduate Studies.

Deborah Down
Coordinator of Graduate Studies

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Website: http://www.arthistory.umd.edu

Courses: ARTH

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample (could be a research paper)
- Description of Research/Work Experience
- Publications/Presentations (recommended)

For admission to the Master's program, students should have an undergraduate degree from an accredited college or university, or its equivalent. Although the applicant must demonstrate a general knowledge of art history, an undergraduate major in art history is not required. Students are required to submit the Graduate Record Examination scores for admission.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	14 Dec

Other Deadlines: Please visit the program website at http://www.arthistory.umd.edu

Requirements

- Art History and Archaeology, Doctor of Philosophy (Ph.D.) (p. 58)
- Art History and Archaeology, Master of Arts (M.A.) (p. 58)

Facilities and Special Resources

The Michelle Smith Collaboratory for Visual Culture, part of the Department of Art History and Archaeology, is designed to foster innovation in teaching and research by combining cutting-edge visual technology with an environment that encourages collaboration among faculty, students, and external scholars. The Collaboratory combines space for work and for meetings with advanced technology and helpful staff to provide a venue in which teachers and students can gather to work, share ideas, and find the resources necessary to explore new technologies and pursue intellectual interests, as well as to promote the department's teaching curriculum. The Department maintains its own Lloyd and Jeanne Raport study collection of some 130 objects from ancient Egypt, Greece, Rome, and the Ancient Americas.

The University Art Gallery, also located in the Parren J. Mitchell Art-Sociology Building, maintains a lively and varied exhibition schedule and has a permanent collection of twentieth-century American prints, drawings and paintings, collections of Japanese prints, and African objects.

The Art Library houses approximately 100,000 volumes as well as a vast body of auxiliary material, including about 70,000 sheets of microfiche. In addition to the University's library resources, graduate students have access to the Library of Congress, the Archives of American Art, the libraries of Dumbarton Oaks, and other research facilities in Washington.

The University of Maryland is located in the suburbs of Washington, D.C., and is 30 minutes from the National Gallery of Art and the National Gallery's Center for Advanced Study in the Visual Arts, the Corcoran Gallery, the Phillips Collection, the Hirshhorn Museum and Sculpture Garden, the Smithsonian American Art Museum, the Museum of African Art, the Freer and Arthur M. Sackler Galleries, which are devoted to the art of East Asia, the National Museum of Women in the Arts, and many other major art museums. The campus is a 40-minute drive from such Baltimore institutions as the Walters Art Gallery and the Baltimore Museum of Art.

In order to enhance the student's curricular choices, the Department maintains an arrangement for course exchange with the Art History department of the Johns Hopkins University in Baltimore. To similar effect, the Department is a member of the Washington Area Art History Consortium, which unites the graduate art history departments of the greater Washington area.

The Department organizes a variety of liaison activities with leading cultural institutions in the Washington-Baltimore area. The Middle Atlantic Symposium in the History of Art is sponsored jointly by the Department and the National Gallery of Art; this annual event provides the opportunity for advanced graduate students from universities in the Middle Atlantic region to present their research at a professional forum. Special seminars are frequently given by curators of such local collections as the National Gallery of Art, the Freer Gallery, or the Department of Prints and Photographs at the Library of Congress.

Art Studio, Master of Fine Arts (M.F.A.)

Thesis option only: 60 credits required

Course	Title	Credits
Core Requirements		
ARTT698	Directed Graduate Studies in Studio Art (ARTT698A)	5
ARTT698	Directed Graduate Studies in Studio Art (ARTT698B)	6
ARTT699	Directed Graduate Studies in Studio Art (ARTT699A)	7
ARTT699	Directed Graduate Studies in Studio Art (ARTT699B)	4
ARTT768	Graduate Colloquium	12
ARTT798	Directed Graduate Studies in Studio Art (ARTT798A)	5
ARTT798	Directed Graduate Studies in Studio Art (ARTT798B)	6
ARTT799	Master's Thesis Research	9
Art History or Art Theory electives		6
Total Credits		60

Candidates for the Master of Fine Arts Degree must complete a program that consists of 60 credit hours. These 60 credit hours are distributed as follows:

- 30-33 credits in Studio;
- 0-3 credits Teaching Internships;
- 6 credits in Art History/Art Theory;
- 12 credits in Graduate Colloquium; and
- 9 credits in Masters Thesis Research.

Graduate Reviews, with committees made up of Graduate faculty members, take place at the end of each semester. Each MFA candidate in his/her final semester must select a thesis advisor and a thesis committee. Students must present their artwork in a Thesis Exhibition, usually installed in the Art Gallery at a designated time near the end of the spring semester. Students must also develop a written component to the Thesis (These have varied in length from five to 50 pages), and present an oral defense of the Thesis to the Thesis committee.

Art Studio (ARTT)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of Art offers a program of graduate study leading to the Master of Fine Arts degree. The program emphasizes independent and interdisciplinary work. The Graduate Faculty consists of 15 active professional artists specializing in a range of studio and post-studio practices, including painting/drawing, sculpture/installation, printmaking, digital and time-based media. The program is small and competitive, and most students receive support in the form of graduate fellowships and assistantships, which include teaching and after-hours studio monitoring.

Financial Assistance

The Department offers eight teaching assistantships and one fellowship. A number of Graduate School Fellowships are also available. Applications should be submitted by January 16 for consideration for a graduate assistantship or fellowship.

Contact

The Department of Art website, www.art.umd.edu provides a lot of information for prospective students. For further information, contact:

Danielle M. Curtis, MFA
Administrative Assistant
Department of Art
1211E Parren J. Mitchell Art-Sociology Building
3834 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1445
Email: DCurtis2@umd.edu

Justin Strom
Professor and Graduate Director
Department of Art
1211E Parren J. Mitchell Art-Sociology Building
3834 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1445
Email: jstrom@umd.edu

Website: http://www.art.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Digitial Submission: 15-20 digital images, website/software or videos/videos documentation indicative of current artistic practice, uploaded to umdart.slideroom.com (https://umdart.slideroom.com/#/Login), $10 supplemental application fee

To apply to the MFA Program applicants are encouraged to complete the Graduate School application available online at https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=umdgrad. Applicants are also required to pay the requisite application fee.

For admission to the graduate program, The Department of Art requires an undergraduate degree with a major in art from an accredited college or university, or its equivalent. A minimum of 30 credit hours of undergraduate work in studio courses and 12 credit hours in art history courses is recommended.

The MFA Degree is the final degree in studio art. Only the highest level of undergraduate artistic achievement is appropriate for graduate application. The Department of Art seeks students who have developed coherent bodies of work that are personal and focused. This body of art work, as professionally documented on CD's, Videos or websites is the primary basis for admittance.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	17 Jan

Other Deadlines: Please visit the program website at http://www.art.umd.edu

Requirements

- Art Studio, Master of Fine Arts (M.F.A.) (p. 59)

Facilities and Special Resources

Each MFA student is provided with 24-hour access to an individual studio. Each studio is approximately 400 sq. ft. The studios are adequately ventilated and meet industry standards in safety. General sculpture facilities include: Approximately 2200 sq. ft. wood shop; approx. 2200 sq.ft. steel fabrication studio; approx. 1500 sq. ft. foundry w/indoor furnace plus outdoor furnace for iron casting. There is space within the building, and outside on the grounds, for sculpture and installations. The printmaking studio (screen, intaglio, relief/litho, digital) is approximately 3000 sq. ft. There are also approx. 8000 sq. ft. of undergraduate painting and drawing studios. Digital media features up to date Macs, large format printers, a CNC router, laser cutter/engraver, and two maker-bot 3D printers. The department encourages multi-media and interdisciplinary approaches to technology.

Within the building housing the Department of Art, there are two galleries and two libraries. The University of Maryland Art Gallery, an independent unit that works closely with the Department of Art, features national and international contemporary and historical exhibitions as well as faculty and annual MFA Thesis shows. The Herman Maril Art Gallery is a student organized gallery that features student exhibitions, lectures, special projects and a space for social activities. The Art Library, separate from the large research libraries on campus, has an outstanding collection of books, catalogues, periodicals and reproductions, all indexed on computer and CD ROM systems.

Astronomy, Master of Science (M.S.)

Thesis or Non-thesis option: 30 credits

Course	Title	Credits
Thesis or Non-Thesis Requirements		
Select one of the following:		30
Thesis (p. 61)		
Non-thesis (p. 61)		
Total Credits		30

Non-thesis Option

30 credits. Non-thesis option requires 30 credits of coursework including six of the nine principal Astronomy graduate courses, and at least 18 credits at the 600 level or above. Students must also submit a scholarly paper and pass a comprehensive final exam.

Candidates for the non-thesis option of the M.S. degree are required to complete 30 credits, including six of the nine principal Astronomy graduate courses (18 credits), with the remaining 12 credits consisting of classroom courses or research credits in Astronomy or supporting fields. One or more scholarly papers are required, usually fulfilled by the 2nd-year project report. The student must also pass a written examination, normally consisting of the written part of the Ph.D. qualifying examination with appropriately chosen passing requirements.

Thesis Option

30 credits. Thesis option requires 30 credits of coursework including six of the nine principal Astronomy graduate courses and six credits of ASTR799.

Candidates for the thesis option of the M.S. degree (less common) are required to complete 30 credits, including 6 credits of thesis research (ASTR799) and eight graduate courses (24 credits). At least six of the courses must come from the nine principal Astronomy graduate courses ASTR601, ASTR606, ASTR610, ASTR615, ASTR620, ASTR622, ASTR630, ASTR670, and ASTR680. A written thesis is required and must be successfully defended in an oral examination. The student must also pass a written examination, normally consisting of the written part of the Ph.D. qualifying examination with appropriately chosen passing requirements.

Astronomy, Doctor of Philosophy (Ph.D.)

Course	Title	Credits
Core Requirements		
Select eight 3-4 credit graduate courses [1]		24-32
ASTR699	Special Problems in Advanced Astronomy	1-6
or ASTR898	Pre-Candidacy Research	
ASTR695	Introduction to Research	1
Dissertation Research Requirements		
ASTR899	Doctoral Dissertation Research	12
Total Credits		38-51

[1] Including at least six of the nine ASTR600 level courses routinely offered.

Course requirements for the PhD in Astronomy currently consist of eight courses, at least six of which must come from the nine principal Astronomy graduate courses ASTR601, ASTR606, ASTR610, ASTR615, ASTR620, ASTR622, ASTR630, ASTR670, and ASTR680. A qualifying exam based on these courses is given in the summer after the second year. A research project is required of all students in the second year of graduate study. Admission to the PhD program is based on course work, the research project and the qualifier.

Students choose a research stream depending on their interest within the field. Courses beyond the required eight are sometimes necessary for advanced research. This will be assessed by the student's thesis committee.

Astronomy (ASTR)

Graduate Degree Program

College: Computer, Mathematical, and Natural Sciences

Abstract

The Department of Astronomy offers programs of study leading to the Master of Science and Doctor of Philosophy degrees. A full schedule of courses covering most fields of astronomy is offered. Some areas in which the faculty focus their research efforts are comets, interplanetary dust, planetary dynamics, extrasolar planets, star and planet formation, mm wavelength astronomy, the interstellar medium, black holes, active galaxies, time-domain astronomy, galaxy formation and evolution, plasma astrophysics, high energy astrophysics, theoretical and computational astrophysics, and cosmology.

Financial Assistance

The Department of Astronomy offers both teaching and research assistantships. Essentially all full-time graduate students receive full financial support. Most students receive research assistantships to cover the summer period. These are either with faculty in the Department or with staff members at the NASA/Goddard Space Flight Center. Some summer teaching assistantships are also available.

Contact

Graduate Entrance Committee
Department of Astronomy
1113 Physical Sciences Complex
4296 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3001
Fax: 301.314.9067
Email: astr-grad@deans.umd.edu

Website: http://www.astro.umd.edu

Courses: ASTR

Relationships: Physics (PHYS) (p. 326)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE): Please contact astr-grad@deans.umd.edu to discuss exceptions. (The University of Maryland's institution code is 5814.)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationastr.pdf)
- Description of Research: 1-2 page description of research and relevant work experience. It should include the topic of research, where it took place and who supervised it, the description of the actual activity (for example, "data reduction for a ground-based optical FTS instrument, wrote reduction software in Python"), whether there were resulting publications, what you learned from pursuing this activity, and what motivated you to pursue it. Note: Please do not upload documents for the Writing Samples. (The admissions committee will not read these.)
- Publications/Presentations
- Faculty of Interest: applicants are asked to select a minimum of 3 *tenured/tenure-track faculty members* (http://www.astro.umd.edu/people/directory.html#Tenured/Tenure-Track%20Faculty).
- GRE Subject

Because of the large number of qualified applicants, the Department of Astronomy has had to restrict formal admission to the Graduate School to those who have shown particularly outstanding work in their undergraduate records. Students who enter the graduate program are normally expected to have strong backgrounds in astronomy, physics, and mathematics. A student with deficiencies in one of these areas may be admitted but will be expected to remedy such deficiencies as soon as possible.

Note that the Department of Astronomy accepts applications for the Ph.D. program only. (Admitted students typically receive an M.S. degree after their second year in the program.) For full details, see http://www.astro.umd.edu/graduate/admissions.html

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Program not accepting applications Fall 2019
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Program not accepting applications Fall 2019

Other Deadlines: Please visit the program website at http://www.astro.umd.edu

Requirements

- Astronomy, Doctor of Philosophy (Ph.D.) (p. 61)
- Astronomy, Master of Science (M.S.) (p. 61)

Facilities and Special Resources

The Department has guaranteed observing time on the new 4.3-meter Discovery Channel Telescope through a partnership with Lowell Observatory. We have strong interactions with other major observatories, where many students and faculty maintain observing programs, and with neighboring scientific institutes, including the Naval Observatory, the Naval Research Lab, and other government agencies. We have joined with Caltech and other partners in the Zwicky Transient Facility, a time-domain survey for studying rare and exotic transient phenomena which will see first light at Palomar Observatory in 2017. Our planetary science team is heavily involved with space missions visiting solar system bodies, such as NASA's Deep Impact, EPOXI, and Rosetta missions to study comets.

The Center for Research and Exploration in Space Science & Technology (CRESST) is the most visible of our many interactions with NASA's

Goddard Space Flight Center, located only 5 miles away. UMD researchers work together with Goddard scientists on many topics, ranging from the study of neutron stars, black holes, and extremely hot gas throughout the universe to the study of planets in our Solar System. This partnership offers an exciting array of opportunities for graduate students to work with Goddard scientists and facilities on their Ph.D. theses.

In 2010, U. Maryland and NASA's Goddard Space Flight Center signed an agreement launching the Joint Space-Science Institute (JSI), a close collaboration between the Departments of Astronomy and Physics and NASA/Goddard. JSI's areas of investigation include black hole physics, high-energy astrophysics, and cosmology.

The Department has also established a partnership with Pontificia Universidad Catolica de Chile (PUC). PUC, one of the top two institutions for astronomy in Chile, signed an agreement with UMD in 2010 that enables astronomy graduate students at both institutions to participate in a joint Ph.D. program starting in their third year. These students split their time between both locations and conduct their thesis research under the supervision of UMD and PUC co-advisors. UMD students gain improved access to Chilean observatories, which include many of the best telescopes in the world.

The Center for Theory and Computation (CTC), a strong group of theoretical astrophysicists within the department, built and maintains a Beowulf cluster to perform computational analyses and simulations across a range of research areas. We also have access to three larger university clusters, including the world-class "DeepThought2" and "MARCC/Bluecrab", which have been invaluable to our students in completing computationally-intensive thesis projects.

In 2014, much of the Department moved to the new Physical Sciences Complex (PSC). Highlights of the building include beautiful architecture, windowed office space for grad students, a grad student lounge, and a state-of-the-art visualization lab for state-of-the-art simulations and displays of large datasets.

This Department is associated with the following research units and facilities:

- Center for Research and Exploration in Space Science and Technology (CRESST) (http://cresst.umd.edu): Partnership between UMCP, UMBC, USRA, and NASA/Goddard, with an emphasis on high-energy astrophysics.
- Joint Space Science Institute (JSI) (https://jsi.astro.umd.edu): Partnership between Astronomy, Physics, and NASA/Goddard, with an initial emphasis on high energy astrophysics, especially black holes. Established 2010.
- Laboratory for Millimeter Wave Astronomy (LMA) (http://www.astro.umd.edu/rareas/lma)
- Center for Theory and Computation (CTC) (http://www.astro.umd.edu/rareas/ctc): Astronomy Dept. center for theory- and computation-related research programs.
- Discovery Channel Telescope (DCT) (http://www.astro.umd.edu/facilities/dct.html)
- Zwicky Transient Facility (ZTF) (https://www.ptf.caltech.edu/ztf)

Atmospheric and Oceanic Science, Master of Science (M.S.)

Non-thesis only (scholarly paper required): 30 credits

Course	Title	Credits
Core Requirements		
AOSC610	Dynamics of the Atmosphere and Ocean I	3
AOSC611	Dynamics of the Atmosphere and Oceans II	3
AOSC620	Physics and Chemistry of the Atmosphere I	3
AOSC621	Physics and Chemistry of the Atmosphere II	3
AOSC680	Introduction to Earth System Science	3
AOSC617	Atmospheric and Oceanic Climate	3
Electives		12
Total Credits		30

M.S. students are also required to attend the weekly department seminar series.

The Atmospheric and Oceanic Science Department offers a non-thesis program leading to the Master of Science Degree. The requirements include course work, a scholarly paper and presentation, and a comprehensive examination. This program provides fundamental training to prepare students for research and operational work in the atmospheric and oceanic sciences.

Each new student will be assigned to a faculty advisor whose interests parallel those of the student. The faculty advisor will assist in the development of the student's course program and will follow the student's progress thereafter. The student may select an alternate advisor at any time, although financial support is dependent upon the availability of funds.

The student must submit an M.S. degree course plan and a tentative schedule for completion by the end of the first nine credit hours. A minimum of 30 semester hours of coursework is required for the degree program. This must include 24 hours of 600-level AOSC courses, including core courses listed below. The remaining 6 semester-hours can come from additional 600-level courses, 3 of these credits can come from AOSC798. The purpose of the scholarly paper is to demonstrate the ability to conduct original or literature research. The paper will become part of the permanent archive of the Department. A Ph.D. dissertation prospectus will satisfy this requirement.

The Comprehensive Examination for MS seeking students consists of a written examination. The written portion is composed of questions covering the subject areas of the following Core courses: AOSC610, AOSC620, and AOSC617. Students will also be expected to complete AOSC611, AOSC621, and AOSC680 with a minimum grade of 3.0 (or to demonstrate mastery of this material). AOSC611 can be replaced by AOSC600 for those students with a specialization in Chemistry who get approval from their advisor, the AOSC Graduate Director, and Department Chair.

All requirements for the M.S. degree must be completed within a five-year period. This time limit applies to any transfer work from other institutions to be included in the student's program. A full-time student can easily complete the M.S. degree in two years.

Atmospheric and Oceanic Science, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete the M.S. course requirements. In addition, doctoral students are required to attend the weekly department seminar series.

Course	Title	Credits
Core Requirements		
Select 30 semester hours of 600-level or above AOSC Department courses		30
Dissertation Research Requirements		
AOSC899	Doctoral Dissertation Research	12
Total Credits		42

Doctoral students are required to complete the M.S. course requirements. In addition, doctoral students are required to attend the weekly department seminar series.

The Department of Atmospheric and Oceanic Science offers a program leading to the Doctor of Philosophy Degree (Ph.D.) in atmospheric and oceanic science. This program is designed to furnish the student with the background necessary to carry out independent and original scientific research. To earn the Ph.D., the student must complete a course work requirement, pass the Candidacy Examinations, and prepare and defend a dissertation.

A student seeking a Ph.D. degree will be assigned to a faculty advisor whose interests parallel those of the student. The academic advisor will establish and chair an advising committee which will oversee the student's degree program.

The course work requirement is 30 semester hours of 600-level or above AOSC Department courses. In addition, the student must take 12 credits of AOSC899. Students may wish to take a number of the core courses in order to prepare for the Qualifying Examination. In addition, there is a Minor course requirement of six semester hours of ancillary courses taken beyond the bachelor's degree in a related scientific area at the 600-level or above. These credits must have a unified or coherent theme. Students may petition the Department for a waiver of a portion of these requirements based on credits earned at another institution at the graduate level.

A student seeking the Ph.D. degree in atmospheric and oceanic science must pass the Candidacy Examinations, which are divided into two parts - The Qualifying Examination and the Specialty Examination. During the Specialty Examination, the student must present and defend a dissertation prospectus to the examination committee. Following successful defense, the student advances to candidacy. Ability to perform independent research must be demonstrated by a written dissertation. The dissertation should be an original contribution to knowledge and demonstrate the ability to present the subject matter in a scholarly style. Upon completion of the dissertation the candidate is required to present the research results at an Atmospheric and Oceanic Science Department seminar and to defend the material to the satisfaction of a Final Examining Committee appointed by the Dean for Graduate Studies.

Full-time students are expected to complete the Qualifying Examination by the end of the second year of graduate study and be admitted to candidacy by the end of the third year. Students must be admitted to candidacy within three years after admission to the doctoral program and at least six months before the date on which the degree will be conferred. The student must complete the entire program for the degree, including the dissertation and final examination, during a four-year period after admission to candidacy.

Graduate Track for Accomplished Scientists

Graduate students with exceptional scientific achievements may, through written petition to the Graduate Director, replace the written portion of the Comprehensive Exam with a seminar followed by an oral examination. To qualify for this track, the candidate needs to meet the following requirements:

1. have an earned MS degree in atmospheric or oceanic science, or a related field, ordinarily from an accredited American university, and receive approval from the five-member Departmental Examination Committee.
2. have published at least five, peer-reviewed, Science Citation Index (SCI) journal articles in atmospheric, oceanic, or a closely related science. He or she must be the lead or corresponding author of at least three of those papers.

The candidate must present an open seminar on his/her past research followed by a closed oral exam by the Examination Committee of at least three faculty plus the Graduate Director, and the Admissions Committee Chair. Two or more negative votes constitutes failure. The final decision will be subject to review by the committee of the whole.

Atmospheric and Oceanic Science (AOSC)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Department of Atmospheric and Oceanic Science offers graduate study leading to the Master of Professional Studies, Master of Science, and Doctor of Philosophy degrees. Coursework in atmospheric and oceanic sciences is also offered at the upper division and graduate level as a service to other campus graduate programs. The educational program is broadly based and involves many applications of the mathematical, physical and applied sciences that characterize modern atmospheric sciences and physical oceanography, including climate and earth system science, and multidisciplinary studies of the interrelationship among the atmosphere, the oceans, the land, and the biota. The Department's advanced degree programs are designed to prepare students for participation in contemporary research in the atmospheric and oceanic science. Research specializations include: atmospheric dynamics; atmospheric chemistry; physical oceanography; air pollution; atmospheric radiative transfer; remote sensing of the atmosphere, ocean, and land; climate variability and change; data assimilation; numerical weather prediction; severe storms; surface-atmosphere, ocean-atmosphere and biosphere-atmosphere interactions; and earth system modeling. The curriculum includes a set of Core courses to provide a fundamental background in atmospheric and oceanic dynamics, physical meteorology and atmospheric chemistry, earth system science and climate, as well as advanced specialized courses. Supervised research using state-of-the-art facilities then prepares the students for future contributions in their chosen field.

The Department's close association with federal agencies in the Washington area provides graduate students with good training and opportunities in atmospheric and oceanic science. As a research assistant, the student has the opportunity to develop a close working relationship with one or more of the scientific agencies.

Financial Assistance

Graduate research and teaching assistantships are available to qualified graduate students. Research assistants carry out research in the areas of physical and dynamic meteorology, physical oceanography, data assimilation, remote sensing, atmospheric chemistry, air pollution, climate dynamics, atmospheric radiation, severe storms, global climate change, and ocean-atmosphere and atmosphere-biosphere interactions. Fellowships are also awarded by the Graduate School to the most qualified applicants. In addition, hourly employment is available in the Department and off campus. Stipends are maintained at a competitive level.

Contact

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Website: http://www.aosc.umd.edu

Courses: AOSC

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

In addition to the requirements of the Graduate School, the department requires a Bachelors or higher degree in meteorology, oceanography, physics, chemistry, mathematics, biology, engineering or other program with suitable emphasis in the sciences. We welcome applications from those with no background in atmospheric sciences. The Core courses offered in the first year of study present students with the necessary background in atmospheric and oceanic science for the more advanced courses. The minimum undergraduate background includes 3 semesters of calculus, differential equations, linear algebra, 3 semesters of calculus-based physics, and 2 semesters of chemistry, one semester of computer programming. Scores from the GRE General Examination are also required.

For information on the Master of Professional Studies in Atmospheric and Oceanic Science (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?MPAO), please see its listing in the Graduate Catalog (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?MPAO).

Note: Applicants must get approval from the AOSC Department to apply to the Spring semester.

The fall admission deadline for priority/funding is January 17 for both domestic and international students. The fall admission deadline for funding is February 1 for both domestic and international students. Final fall admission deadlines are May 17 for domestic students and March 15 for international students.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Priority Consideration: 17 Jan / Final: 15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority Consideration: 17 Jan / Final: 15 Jan

Other Deadlines: Please visit the program website at http://www.aosc.umd.edu

Requirements

- Atmospheric and Oceanic Science, Doctor of Philosophy (Ph.D.) (p. 63)
- Atmospheric and Oceanic Science, Master of Science (M.S.) (p. 63)

Facilities and Special Resources

The Department participates in the Earth System Science Interdisciplinary Center (ESSIC) and the Cooperative Institute for Climate Studies (CICS). These institutions conduct research, and offer opportunities for graduate research beyond those offered by the department faculty. In addition, the Department maintains close research and teaching associations with Departments of Mathematics and Chemistry, as well as the Institute for Physical Science and Technology (IPST), Center for Scientific Computation and Mathematical Modeling (CSCAMM), and nearby government agencies including NOAA, NASA, ONR, USDA, NIST, and Marylands Department of the Environment and Department of Natural Resources. Special facilities that support the Department's teaching and research activities include sophisticated computing facilities allowing access to a variety of atmospheric and oceanographic datasets, a laboratory for atmospheric chemistry, a mobile air pollution laboratory, access to research aircraft, a variety of supercomputers, radar, windprofiler at Fort Meade, historical data. Most importantly the students are encouraged to exploit the resources of the nearby government laboratories: NASA Goddard Space Flight Center, NOAA National Centers for Environmental Prediction.

The Department maintains a specialized library with several hundred text and reference books in meteorology and allied sciences, specialized series of research reports, and many journals. The campus provides a main library as well as specialized libraries in chemistry, astronomy, and engineering. Several excellent government libraries in the area, including the Library of Congress, the NASA Goddard Space Flight Center,

the National Archives, and the NOAA libraries provide unsurpassed resources.

The University of Maryland is located in an area of unparalleled professional resources. Because of its proximity to the nation's capital, The University of Maryland is able to interact closely with the many governmental groups interested in various aspects of the atmospheric, oceanic and earth system sciences. Scientists from government laboratories participate in many aspects of graduate education, such as giving lectures in classes, presenting research results in seminars, and serving on dissertation committees. Likewise, the Department faculty often attend and participate in the seminars, colloquia and scientific workshops being held at these neighboring institutions.

The Washington, D.C. chapter of the American Meteorological Society consists of about 400 members who hold professional meetings each month. The Washington, D.C. area is frequently the site of national and international conferences, most notably of the American Association for the Advancement of Science and the American geophysical Union. In addition to the various government and academic institutions, the Washington metropolitan area contains numerous well-known private contractors and consulting companies involved in meteorology and oceanography, which provide employment opportunities for students both before and after graduation.

As a member of the University Corporation for Atmospheric Research, the department enjoys the common facilities offered by the National Center for Atmospheric Research such as research aircraft and supercomputers.

Atmospheric and Oceanic Science Technology, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
Select two out the following three certificate programs:		24
Computational Methods in Atmospheric and Oceanic Science:		
AOSC630	Statistical Methods in Meteorology and Oceanography	
AOSC652	Analysis Methods in Atmospheric and Oceanic Science	
Select two additional courses approved by advisor		
General Atmospheric and Oceanic Science:		
AOSC431	Atmospheric Thermodynamics	
or AOSC610	Dynamics of the Atmosphere and Ocean I	
AOSC432	Dynamics of the Atmosphere and Ocean	
or AOSC611	Dynamics of the Atmosphere and Oceans II	
AOSC617	Atmospheric and Oceanic Climate	
AOSC670	Physical Oceanography	
Air Quality Science and Technology:		
AOSC600	Synoptic Meteorology I	
AOSC624	Remote Sensing of Surface Climate	
AOSC637	Atmospheric Chemistry	
AOSC633	Atmospheric Chemistry and Climate	
Select two courses from the remaining certificate program		6
Total Credits		30

Master of Professional Studies (MPAO) The Master of Professional Studies in Atmospheric and Oceanic Science is designed for meteorologists, oceanographers and environmental scientists who need cutting-edge skills and knowledge in atmospheric and oceanic science, in the computational methods used in our field, and in air quality science. The Director of Professional Studies will advise students in planning his or her course of study, and will provide career advice and The degree is earned by successful completion of ten 3-credit courses. Students must complete two out of the following three Certificate programs, each of which consists of four courses, plus two courses from the remaining Certificate Program. The MPAO program is designed with the needs of working professionals in mind, and can be completed on a part-time basis over no more than 5 years, or on a full-time basis in 1 year and one semester.

Atmospheric and Oceanic Science Technology (MPAO)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Contact

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Website: http://www.aosc.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Jun	15 Nov
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	29 Sep

Other Deadlines: Please visit the program website at http://www.aosc.umd.edu

Requirements

- Atmospheric and Oceanic Science Technology, Master of Professional Studies (M.P.S.) (p. 66)

Atmospheric and Oceanic Science, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Core Requirements		
AOSC431	Atmospheric Thermodynamics	3
or AOSC610	Dynamics of the Atmosphere and Ocean I	
AOSC432	Dynamics of the Atmosphere and Ocean	3
or AOSC611	Dynamics of the Atmosphere and Oceans II	
AOSC617	Atmospheric and Oceanic Climate	3
AOSC670	Physical Oceanography	3
Total Credits		12

Atmospheric & Oceanic Science (Z046)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Contact

Tamara Hendershot
Department of Atmospheric and Oceanic Science
3405 Atlantic Building
4254 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5389
Fax: 301.314.9482
Email: tbarksda@umd.edu

Website: http://www.aosc.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Jun	17 Nov
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.aosc.umd.edu

Requirements

- Atmospheric and Oceanic Science, Post-Baccalaureate Certificate (P.B.C.) (p. 67)

Beekeeping, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Core Requirements		
ENTM745	Bee Biology and Beekeeping	3
ENTM746	Commercial Beekeeping	3
ENTM747	Pollinator Health	3
ENTM751	The History and Culture of Bees and Beekeepers	3
Total Credits		12

In this 12-credit certificate, students learn about the anatomy, physiology, and ecology of the honeybee, how to construct and maintain a hive, and best practices for maintaining a healthy colony.

Beekeeping (Z088)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Contact

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College Park, MD 20742
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Tammatha O'Brien
Academic Program Director
Department of Entomology
3118 Plant Science
4291 Fieldhouse Drive
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College Park, MD 20742
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Email: tammatha@umd.edu

Website: http://oes-entm.umd.edu/

Relationships: Applied Entomology (MPAE) (p. 46), Integrated Pest Management (Z089) (p. 259), Organic and Sustainable Agriculture (Z090) (p. 322), Urban Agriculture (Z091) (p. 421)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (1)
- Strong background in biology

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	26 July
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July

Other Deadlines: Please visit the program website at http://oes-entm.umd.edu/

Requirements

- Beekeeping, Post-Baccalaureate Certificate (P.B.C.) (p. 67)

Behavioral and Community Health, Doctor of Philosophy (Ph.D.)

The PhD in Behavioral and Community Health is an 82 credit program depending on the number of course requirements that can or cannot be waived. This research-intensive degree includes coursework, qualifying exams, and individual research that results in a dissertation.

Course	Title	Credits
Core Requirements		
SPHL600	Foundations of Public Health	3
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL611	Public Health Ethics	1
or SPHL612	Research Ethics	
MIEH600	Foundations of Environmental Health	3
HLSA601	Introduction to Health Systems	3
EPIB697	Public Health Data Management	3
EPIB6XX	(Any advanced EPIB course)	3
HLTH609	Public Health Journal Club	1
HLTH625	Community Assessment through Qualitative Methods	3
HLTH665	Health Behavior I	3
HLTH672	Public Health Informatics	3
HLTH710	Methods and Techniques of Research	3
HLTH776	Community Health Program Evaluation	3
HLTH780	Community Health	3
HLTH666	Health Behavior II	3
HLTH652	Quantitative Research Methods I in Public health	3
HLTH653	Quantitative Research Methods II in Public Health	3
HLTH711	Advanced Research Methods in Health	3
HLTH712	Applied Research Methods in Behavioral and Community Health	3
Electives		9
HLTH898	Pre-Candidacy Research	6
Dissertation Research Requirements		
HLTH899	Doctoral Dissertation Research	12
Total Credits		82

Behavioral and Community Health (BCHL)

Graduate Degree Program
College: Public Health

Abstract

The Department offers graduate study leading to the Master Public Health (MPH) in Behavioral and Community Health and the Doctor of Philosophy degree in Behavioral and Community Health. The graduate programs are designed to prepare behavioral and community professionals with specific skills and the ability to implement theoretical knowledge in a practical setting.

The goal of the doctoral program is to develop health professionals competent in understanding the health needs of populations who are qualified to conduct research in order to implement programs and policies aimed at improving the public's health. This program is very selective and admission is competitive. The program provides students with the opportunity to develop research skills essential in making

significant contributions to the scientific and professional literature in behavioral and community health.

Degree programs may be completed either full-time or part-time, although full-time is preferred. Faculty support coursework, research and practice experiences in many areas, including: health communication; health behavior; adolescent health; women's health; health literacy and health disparities. Faculty hold doctoral degrees in public health, psychology, health education, sociology and epidemiology. The Department offers excellent research and laboratory facilities including the Center for Young Adult Health and Development, Laboratory for Health Behavior Assessment (http://webhelper.centurylink.com/index.php?origURL=http%3A//www.hhp.umd.edu/dpch/research/LHBAI/index.html&r=&bc=) and Intervention, and The Center for Health Behavior Research (http://webhelper.centurylink.com/index.php?origURL=http%3A//www.hhp.umd.edu/dpch/CHBR/index.cfm&r=&bc=)

Financial Assistance

The Department offers a limited number of fellowships, and graduate teaching and research assistantships. Please contact the Director of Graduate Studies for further information.

Contact

Katherine Sharp
Director of Graduate Studies
Department of Behavioral and Community Health
1234V School of Public Health Building
4200 Valley Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2464
Fax: 301.314.9167
Email: ksharp1@umd.edu

Website: http://www.sph.umd.edu/bch

Courses: HLTH

Keywords: Ph.D. in Behavioral and Community Health. Areas of study including but not limited to: Health Behavior, Stress Management, Violence Prevention, Women's Health, Health Disparities, Traffic Safety, Sexual Health, Health Communication, Community Health.

Relationships: Epidemiology (EPDM) (p. 195), Health Administration (HLSA) (p. 230), Maternal and Child Health (MCHS) (p. 290)

Admissions

Admission Requirements

- Minimum 3.0 undergraduate GPA; 3.5 graduate GPA
- GRE scores for exam taken within the last five years (UMD SPH code = 0485)
- Three Letters of recommendation that address your academic capabilities
- Statement of purpose and research interests
- Resume or CV

Program Admission Pre-Requisites

- 6 credits Psychology or Sociology or Anthropology

For admission to the doctoral program, the Department requires an undergraduate GPA of 3.0 (if a masters degree has not been obtained) and/or a graduate GPA of 3.5. In addition, the Department requires satisfactory GRE scores, three letters of recommendation, a resume or curriculum vitae, and a statement of purpose from all applicants. Completed admission applications (those that include all supporting materials including GRE scores and letters of recommendation) must be received by November 15th for best consideration. February 15th is the final deadline to be considered for Fall enrollment.

How to Apply: Applications should be submitted through the Schools of Public Health Application Service (SOPHAS) at www.SOPHAS.org (http://www.SOPHAS.org). Remember to designate the University of Maryland School of Public Health, College Park, as one of your school choices along with your desired program. The University of Maryland School of Public Health GRE Code in SOPHAS is 0485 (the GRE is required in all applications).

For information please see http://sph.umd.edu/content/graduate-admissions.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Best Consideration: 16 Nov / Final: 15 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Best Consideration: 16 Nov / Final: 15 Feb

Other Deadlines: Please visit the program website at http://www.sph.umd.edu/bch

Requirements

- Behavioral and Community Health, Doctor of Philosophy (Ph.D.) (p. 68)

Facilities and Special Resources

The Department has research specializations in a variety of areas including:

- Minority health/social inequalities in health
- Alcohol and drug abuse
- Safety and health
- Sexual health
- Adolescent health and risk behavior
- Violence prevention/community violence
- Public health communication
- Health literacy
- Treatment of nicotine dependence

Specialized laboratories operating within the Department include:

- The Center for Young Adult Health and Development
- The Laboratory for Health Behavior Assessment and Intervention
- The Center for Health Behavior Research

The proximity of the nation's capital, the National Institutes of Health, the National Library of Medicine, and Food and Drug Administration, the Maryland Department of Health and Mental Hygiene, and numerous public health focused private and not-for-profit organizations/agencies render the University of Maryland unusually well suited for graduate work in behavioral and community health.

Behavioral and Community Health, Master of Public Health (M.P.H.)

Non-thesis option only: 45 credits

Course	Title	Credits
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
HLTH625	Community Assessment through Qualitative Methods	3
HLTH665	Health Behavior I	3
HLTH672	Public Health Informatics	3
HLTH710	Methods and Techniques of Research	3
HLTH780	Community Health	3
HLTH778	Internship in Public Health	4
HLTH786	Capstone Project in Public Health	3
Electives		9
Total Credits		45

The MPH in Behavioral and Community Health is a 45-credit program which includes coursework, an internship, and a MPH project. It takes 2 years to complete as a full-time student and 3.5-5.0 years to complete as a part-time student. The program cannot be completed in less than 2 years due to limited course availability. At this time, the majority of courses are held in-person on the College Park campus, a few are online.

Behavioral and Community Health (MBCH)

Graduate Degree Program
College: Public Health

Abstract

The Department offers graduate study leading to the Master Public Health (MPH) in Behavioral and Community Health and the Doctor of Philosophy degree in Behavioral and Community Health. The graduate programs are designed to prepare behavioral health professionals with specific skills and the ability to implement theoretical knowledge in a practical setting.
The mission of the MPH program is to promote the development of behavioral and community health professionals who understand the science, theory, and practice of public health and can apply this knowledge toward the enhancement of health status of communities. The MPH program is designed as a professional degree to prepare behavioral and community health professionals working in public health service as practitioners, administrators, supervisors, educators, consultants, and researchers. Students will participate in both academic and applied training in program planning and implementation, program evaluation, public policy analysis, research, and management.

Degree programs may be completed either full-time or part-time. All classes are held from either 4:00pm-6:45pm or 7:00pm-9:45pm Monday through Friday. Faculty support coursework, research and practice experiences in many areas, including: health communication; health behavior; adolescent health; women's health; health literacy and health disparities. Faculty hold doctoral degrees in public health, psychology, health education, sociology, and epidemiology. The Department offers excellent research and laboratory facilities including the Center for Young Adult Health and Development, Laboratory for Health Behavior Assessment and Intervention and The Center for Health Behavior Research.

Financial Assistance

The Department offers a limited number of fellowships, and graduate teaching and research assistantships. Contact the Director of Graduate Studies for further information.
Contact Statement

Contact

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Director of Graduate Studies
Department of Behavioral and Community Health
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University of Maryland
College Park, MD 20742
Telephone: 301.405.2464
Fax: 301.314.9167
Email: ksharp1@umd.edu

Website: http://www.sph.umd.edu/bch

Courses: HLTH

Relationships: Epidemiology (EPID) (p. 196), Health Administration (HLSA) (p. 230), Maternal and Child Health (MCHS) (p. 290)

Admissions

Admission Requirements

- Minimum 3.0 undergraduate GPA
- GRE scores for exam taken within the past five years (UMD SPH code = 0485)
- Three Letters of recommendation that address your academic capabilities
- Statement of goals and interests
- Resume or CV

An undergraduate GPA of at least 3.0 is required for admission to the MPH program. For best consideration, completed admission applications (those that include all supporting materials including GRE scores and letters of recommendation) must be received by December 15th to be considered for Fall enrollment. The final deadline in April 15th.

How to Apply: Applications should be submitted through the Schools of Public Health Application Service (SOPHAS) at www.SOPHAS.org (http://www.SOPHAS.org). Remember to designate the University of Maryland School of Public Health, College Park, as one of your school choices along with your desired program. The University of Maryland School of Public Health GRE Code in SOPHAS is 0485 (the GRE is required in all applications).

For information please see http://sph.umd.edu/content/graduate-admissions.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Priority Consideration: 14 Dec / Final: 12 April
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority Consideration: 14 Dec / Final: 15 Feb

Other Deadlines: Please visit the program website at http://www.sph.umd.edu/bch

Requirements

- Behavioral and Community Health, Master of Public Health (M.P.H.) (p. 70)

Facilities and Special Resources

The Department has research specializations in a variety of areas including:

- Minority health/social inequalities in health
- Alcohol and drug abuse
- Safety and health
- Sexual health
- Adolescent health and risk behavior
- Violence prevention/community violence
- Public health communication
- Treatment of nicotine dependence

Specialized laboratories operating within the Department include:

- The Laboratory for Health Behavior Assessment and Intervention
- The Center for Health Behavior Research
- The Center for Young Adult Health and Development

The proximity of the nation's capital, the National Institutes of Health, the National Library of Medicine, the Food and Drug Administration, the Maryland Department of Health and Mental Hygiene, and numerous public health focused private and not-for profit organizations/agencies render the University of Maryland unusually well suited for graduate work in behavioral and community health.

Bilingual Speech-Language Pathology, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
HESP603	Seminar in Cultural and Linguistic Diversity in Communication Disorders	1
HESP617	Cultural and Linguistic Diversity in Communication and its Disorders	2
HESP605	Assessment & Intervention in Bilingual Populations	3
HESP728	Advanced Clinical Practice in Speech	3
HESP648	Clinical Practice in Speech (HESP648A - Diagnostic Procedures)	1
HESP648	Clinical Practice in Speech (HESP648B - Therapeutic Procedures)	2
Total Credits		12

Bilingual Speech-Language Pathology (Z125)

Graduate Certificate Program
College: Behavioral & Social Sciences

ABSTRACT

The University of Maryland Certificate in Bilingual Speech#Language Pathology will provide students with the knowledge and skills needed to become qualified bilingual speech#language pathology service providers. This program is intended for students who are enrolled in the Master's program in Speech#Language Pathology in Hearing and Speech Sciences (HESP), and who demonstrate native or near native proficiency in a language other than English. The program comprises 12 credit hours of coursework in addition to a supervised clinical practicum experience.

CONTACT

José Ortiz
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0100 Samuel J. LeFrak Hall
7251 Preinkert Dr.
University of Maryland
College Park, MD 20742
Telephone: 301.405.4228
Email: jortiz5@umd.edu

Website: (https://hesp.umd.edu/graduate/bilingual-certification-program-speech-language-pathology)https://hesp.umd.edu/graduate/bilingual-certification-program-speech-language-pathology

Admissions

Those who wish to apply to the Certificate in Bilingual Speech#Language Pathology should indicate this on their application to the master's program. Students who have been admitted to the master's program, but who have not applied to the Certificate in Bilingual Speech#Language

Pathology will have until August 1st before their first semester of graduate study to apply. Applications will be reviewed and a decision will be made before the start of the semester.

Language Proficiency on Admission

Students are required to specify a target language and are required to demonstrate intermediate#advanced proficiency in this language. On application to the Certificate in Bilingual Speech#Language Pathology, students must submit proof of language proficiency. This includes any of the following: academic transcripts demonstrating successful completion of advanced foreign language coursework (high school and college), a passing grade on a language proficiency examination, or a written statement of language exposure.
Each application will be reviewed and evaluated individually in order certify that each student does demonstrate the required level of proficiency to participate in the Certificate in Bilingual Speech#Language Pathology.

An important component of this program is the clinical aspect of working in a language other than English, which is achieved through the off# campus placement (HESP 728). Though the goal is to provide every student with an opportunity to participate in a practicum placement using his or her target language, it is possible that finding local supervision for a given language may prove to be extremely difficult. Other resources may be available to our department in some instances. For example, there are a number of modern language departments at the university, which potentially offer access to speakers of those languages. This provides access to resources for many, but not all, languages in which our student clinicians may wish to practice.

For this reason, acceptance into the program would depend on the student and faculty jointly developing a solution, such as an off#campus placement in another region or country.

Requirements

- Bilingual Speech-Language Pathology, Post-Baccalaureate Certificate (P.B.C.) (p. 71)

Biochemistry, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Course	Title	Credits
Core Requirements		
BCHM671	Protein Chemistry and Enzymic Catalysis	3
BCHM675	Biophysical Chemistry	3
BCHM661	Nucleic Acids I	2
BCHM662	Nucleic Acids II	2
Thesis or Non-Thesis Requirements		
Select one of the following options:		20
Thesis (p. 72)		
Non-thesis (p. 72)		
Total Credits		30

The M.S. degree program offers both the thesis and non-thesis options. The thesis option requires an oral defense of the thesis. Specific regulations are available from the Department of Chemistry and Biochemistry or from: www.chem.umd.edu/graduateprogram/

Thesis Option

Thesis option requires 24 credits of coursework (including core courses) with at least 12 credits at the 600 level or higher. In addition, students must complete six credits of BCHM799. Students are also required to present one seminar

Non-Thesis Option

Non-thesis option requires 30 credits of coursework (including core courses) with at least 18 credits at the 600 level or higher. This coursework should include six credits of BCHM699. Students are also required to submit a scholarly paper

Biochemistry, Doctor of Philosophy (Ph.D.)

1. Doctoral students are required to complete 21 credits of coursework, with 19 credits completed by the end of the fourth semester. In addition, students must complete 12 credits of BCHM899.
2. Non-course requirements include an oral defense of a written research proposal, presentation of a seminar and an independent research proposal, and an oral defense of a publication-quality dissertation that advances the field.

Course	Title	Credits
Core Requirements		
BCHM671	Protein Chemistry and Enzymic Catalysis	3
BCHM675	Biophysical Chemistry	3
BCHM661	Nucleic Acids I	2
BCHM662	Nucleic Acids II	2
BCHM699	Special Problems in Biochemistry	2
BCHM677	Computational Tools in Biochemistry	1
BCHM889	Seminar	2
BCHM698	Literature Seminar in Biochemistry	2
Electives with advisor approval (minimum of 4 credits)		4
Dissertation Research Requirements		
BCHM899	Doctoral Dissertation Research	12
Total Credits		33

Specific regulations are available from the Department of Chemistry and Biochemistry or from: www.chem.umd.edu/graduateprogram/phdinbiochemistry/

Biochemistry (BCHM)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Graduate Program in Biochemistry offers study leading to Doctor of Philosophy and Master of Science degrees. The program emphasizes intensive mentoring, formal and informal training in presentation skills, scientific writing, bioinformatics, teaching chemistry and biochemistry, and professional ethics. Research specialization is available in protein structure, dynamics, and function; protein-protein and protein-nucleic acid interaction; protein and nucleic acid biochemistry; RNA and DNA structure, dynamics, interactions, and function; macromolecular folding

and supramolecular assembly; biomolecular nuclear magnetic resonance spectroscopy, X-ray crystallography; proteomics, metabolomics mass spectrometry; membrane proteins, protein-lipid interaction, membrane structure and function; carbohydrate chemistry, glycobiology; immunology; bio-organic chemistry; post-translational protein modification and signaling; metabolic regulation; enzyme mechanisms; drug metabolism. Several of the biochemistry program faculty are members of the Institute for Bioscience and Biotechnology Research (IBBR) or other Related Programs and Campus Units listed below. Further information about the Biochemistry Graduate Program can be found at https://www.chem.umd.edu/graduateprogram/phdinbiochemistry and http://www.chem.umd.edu/.

Financial Assistance

Ph.D. candidates are normally supported on graduate teaching assistantships during their first year as graduate students. Teaching assistants usually instruct undergraduate laboratory and recitation classes and receive in return a tuition waiver of ten credits each semester, salary, and health care benefits. Ph.D. candidates are normally supported in subsequent years on graduate research assistantships. Financial support is not generally available to M.S. candidates.

Contact

Graduate Programs Office
Department of Chemistry and Biochemistry
0129 Chemistry Building
8051 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1028
Fax: 301.314.9121
Email: chembchmadm@umd.edu

Website: http://www.chem.umd.edu

Courses: BCHM BIOE BIPH BISI CBMG CHEM CHPH

Relationships: Bioengineering (BIOE) (p. 74), Biological Sciences (BISI) (p. 81), Biophysics (BIPH) (p. 83), Chemical Physics (CHPH) (p. 115), Chemistry (CHEM) (p. 116)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Description of Research/Work Experience
- GRE Subject (optional/highly recommended)

Admission to graduate study in Biochemistry at the University of Maryland requires a minimum of a Bachelor of Science (B.S.), Bachelor of Arts (B.A.) or equivalent degree. Applications are normally accepted only from Ph.D.-seeking students. The area in which the undergraduate degree has been earned need not be chemistry or biochemistry, but previous coursework must normally include a minimum of 30 semester or 40 quarter hours of chemistry, including at least 1 year of general chemistry, 1 year of organic chemistry and 1 semester of biochemistry, as well as laboratory courses in organic chemistry and biochemistry. A course in physical chemistry and a laboratory course in analytical chemistry are also desirable. Typical overall grade point averages for successful applicants are 3.0 or greater (on a scale where the average grade is 2.0), and averages in science and math courses are generally higher than this. Three letters of reference indicating a potential for independent, creative scientific research are also required.

The competition for available space may limit admissions to persons with credentials above these minimum requirements.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	17 Jan

Other Deadlines: Please visit the program website at http://www.chem.umd.edu

Requirements

- Biochemistry, Doctor of Philosophy (Ph.D.) (p. 72)
- Biochemistry, Master of Science (M.S.) (p. 72)

Facilities and Special Resources

Biochemistry faculty and graduate students work in well-equipped, state-of-the-art research laboratories. Instrumentation and facilities that are available for research in biochemistry include analytical and preparative ultracentrifuges, high- and ultra-high field nuclear magnetic resonance spectrometers (600, 800, 900, 950 MHz), X-ray diffractometers and SAXS, fluorimeters, circular dichroism spectrometers, fluorescence- and phosphor-imagers, calorimeter, mass spectrometers, proteomics and genomics core facilities, Sanger and next-generation DNA sequencing, microarray, quantitative PCR, electron microscopes, atomic force microscopes, confocal and TIRF fluorescence microscopes, flow cytometer, animal colony, fermentation pilot plant, high-performance computing, and a chemistry-biochemistry library.

Bioengineering, Doctor of Medicine and Master of Science (dual degree) (M.D. and M.S.)

The Doctor of Medicine / Master of Science (M.D. / M.S.) Program is a dual degree program offered with the University of Maryland School of Medicine. Students applying to the M.D./M.S. Program must first apply to and be admitted to the M.D. program at the School of Medicine, and

should indicate their interest in the dual-degree program when applying to the Medical School. The program is organized in the following fashion: 2 years M.D. studies + 1 year M.S. studies + 2 years M.D. studies. The objective of this program is to broaden the educational and research scope of medical doctors in bioengineering. The program should be attractive to those interested in areas including clinical research, biomaterials, biomedical imaging, medical device innovation, medical device development, and drug development. Graduates of the combined program will receive a Doctor of Medicine degree from the University of Maryland School of Medicine as well as a Master of Science degree from the A. James Clark School of Engineering at the University of Maryland, College Park.

Bioengineering, Doctor of Medicine and Doctor of Philosophy (dual degree) (M.D. and Ph.D.)

The Doctor of Medicine / Doctor of Philosophy (M.D. / Ph.D.) Program is a dual degree program offered with the University of Maryland School of Medicine. Students applying to the M.D./ Ph.D. Program must first apply to and be admitted to the M.D. program at the School of Medicine, and should indicate their interest in the dual-degree program when applying to the Medical School. The program is organized in the following fashion: 2 years M.D. studies + 4 years Ph.D. studies + 2 years M.D. studies. The objective of this program is to develop clinicians who are deeply involved in biomedical research. Graduates of the program are typically interested in pursuing both clinical work and bioengineering research in their future careers. Graduates of the combined program will receive a Doctor of Medicine degree from the University of Maryland School of Medicine as well as a Doctor of Philosophy degree from the A. James Clark School of Engineering at the University of Maryland, College Park.

Bioengineering, Master of Science (M.S.)

Thesis only: 30 credits

Course	Title	Credits
Core Requirements		
BIOE601	Biomolecular and Cellular Rate Processes	3
BIOE604	Cellular and Physiological Transport Phenomena	3
BIOE612	Physiological Evaluation of Bioengineering Designs	3
Electives		15
BIOE799	Master's Thesis Research	6
Total Credits		30

The terminal M.S. degree is intended for students who are interested in expanding their knowledge of bioengineering through research, beyond what is available at the B.S. level. Therefore, the M.S. program involves both coursework and a well-defined research project culminating in a M.S. thesis. The M.S. program may be suitable for top UMD undergraduates engaged in research via an individualized, combined B.S. / M.S. program. A combined M.D. / M.S. program is also available. It should be noted, however, that due to limited resources, the department does not actively recruit students to its M.S. program. Students interested in the M.S. program should contact the Bioengineering Graduate Office prior to submitting an application.

Bioengineering, Doctor of Philosophy (Ph.D.)

Course	Title	Credits
Required courses:		
BIOE601	Biomolecular and Cellular Rate Processes	3
BIOE604	Cellular and Physiological Transport Phenomena	3
BIOE612	Physiological Evaluation of Bioengineering Designs	3
BIOE608	Bioengineering Seminar Series	3
BIOE605	BIOE Graduate Studies I	1
BIOE606	BIOE Graduate Studies II	1
Restricted Elective (chosen with advisor)		3
Unrestricted Electives (chosen with advisor)		12
Dissertation Research Requirements		
BIOE899	Doctoral Dissertation Research	18
Total Credits		47

The educational approach of the Ph.D. program is to combine the principles and applications embedded in engineering with the sciences of biology, medicine, and health. The motivation for many of the research projects stems from the belief that developments at the interface of biology and engineering will advance the efficacy of health care by developing new paradigms for the diagnosis of disease, and the development and delivery of new therapeutics. Our bioengineering students will gain the knowledge base and skill sets to quantitatively measure, and rationally manipulate cells, tissues, and integrated systems. Bioengineers must bring problem solving skills and design methodologies to the study of biology in an effort to translate the biological sciences into medical practice in an analogous manner to the transformation of chemistry into industrial practice that occurred in the 20th century.

Bioengineering (BIOE)

Graduate Degree Program
College: Engineering

Abstract

Welcome to the Graduate Program in the Fischell Department of Bioengineering at the A. James Clark School of Engineering, University of Maryland. Our program represents the strong intellectual interdisciplinary infrastructure and collaborative culture that links engineering, biology, and medicine at our university.

Our program provides a basic understanding of bioengineering at the molecular and cellular level, focusing on:

- Medical Devices
- Biocomputational Systems
- Optical Technologies
- Imaging
- Drug Delivery
- Therapeutics Design
- Biomolecular Engineering
- Cell and Tissue Engineering

- Biomaterials
- BioChips

With strong, funded research programs and innovative partnerships with the National Institutes of Health, Food and Drug Administration, and University of Maryland School of Medicine, the Fischell Department of Bioengineering is an exciting place for graduate study.

Financial Assistance

Graduate assistantships and fellowships are available on a competitive basis to Ph.D. students. No separate financial support application is required. Students will automatically be considered for eligible forms of support.

Contact

Please see the program's website for program description, admission requirements, and financial aid information.

Graduate Program
The Fischell Department of Bioengineering
3102A James Clark Hall
8278 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8268
Fax: 301.405.9953
Email: bioe-grad@umd.edu

Website: http://www.bioe.umd.edu

Courses: BIOE

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations

Admission to the Graduate Program in Bioengineering requires a Bachelor's degree in a science or engineering discipline from an accredited undergraduate institution. Applicants with degrees in non-engineering disciplines, such as biology, chemistry, physics, or mathematics, are expected to have the following prerequisite courses: Calculus I, II, III; Differential Equations; and Thermodynamics. These courses would ideally have been completed by the time of application, but they may also be in progress.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	8 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	8 Jan

Other Deadlines: Please visit the program website at http://www.bioe.umd.edu

Requirements

- Bioengineering, Doctor of Medicine and Doctor of Philosophy (dual degree) (M.D. and Ph.D.) (p. 74)
- Bioengineering, Doctor of Medicine and Master of Science (dual degree) (M.D. and M.S.) (p. 73)
- Bioengineering, Doctor of Philosophy (Ph.D.) (p. 74)
- Bioengineering, Master of Science (M.S.) (p. 74)

Facilities and Special Resources

The Department is located in A. James Clark Hall, a 184,000 square foot building serving as a central hub for new partnerships and collaboration for organizations throughout the Maryland and Washington, D.C. region.

Approximately 7,332 sq. feet of classroom space and 11,402 sq. feet of class lab space is used to support instructional capabilities. To help create an organic flow of ideas between many disciplines, the building features flex classrooms and two stories of flexible laboratories to the campus – including wet and dry spaces as well as a vivarium.

Optical laser and imaging laboratories feature state-of-the-art technology in digital fabrication, rapid prototyping, 3D printing, optics, and bioinformatics. In the imaging suite, researchers have the ability to examine molecular resolution of pathogens – whether in the GI tract or bloodstream – that show how a nano-carrier delivers a drug to a specific tumor site. Additionally, laser devices and magnetic resonance imagers will allow a close examination of cross-sections of the body and brain.

Bioengineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
Modeling of Biological Systems		3
Application of Biomaterials		3
Biological Transport Phenomena		3

Electives	21
Total Credits	30

Contingent on availability of courses. Please see advisor for further details.

Bioengineering (online) (MEBI)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Students in our Bioengineering degree programs will learn to integrate priciples of engineering and biological systems to develop new technologies and devices that improve human health, fight disease, and aid persons with disabilities. Our biomedical engineering masters program is uniquley positioned to offer educational strengths in engineering, biology, and medicine.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/bioengineering.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 Jul	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Bioengineering, Master of Engineering (M.Eng.) (p. 75)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Bioengineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
Select one of the following:		3
	Modeling of Biological Systems	
	Application of Biomaterials	
	Biological Transport Phenomena	
Electives		9
Total Credits		12

Contingent on availability of courses. Please see advisor for further details.

Bioengineering (online) (Z083)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Students in our Bioengineering degree programs will learn to integrate priciples of engineering and biological systems to develop new technologies and devices that improve human health, fight disease, and aid persons with disabilities. Our biomedical engineering masters program is uniquley positioned to offer educational strengths in engineering, biology, and medicine.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/bioengineering

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 Jul	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Bioengineering, Post-Baccalaureate Certificate (P.B.C.) (p. 77)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Bioengineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
Modeling of Biological Systems		3
Application of Biomaterials		3
Biological Transport Phenomena		3
Electives		21
Total Credits		30

Contingent on availability of courses. Please see advisor for further details.

Bioengineering (PMBI)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Students in our Bioengineering degree programs will learn to integrate priciples of engineering and biological systems to develop new technologies and devices that improve human health, fight disease, and aid persons with disabilities. Our biomedical engineering masters program is uniquley positioned to offer educational strengths in engineering, biology, and medicine.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

FINANCIAL ASSISTANCE

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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University of Maryland
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Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/bioengineering.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Bioengineering, Master of Engineering (M.Eng.) (p. 78)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.
This program is also offered 100% online. Please see Bioengineering (MEBI) for more information.

Bioengineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
Select one of the following:		3
	Modeling of Biological Systems	
	Application of Biomaterials	
	Biological Transport Phenomena	
Electives		9
Total Credits		12

Contingent on availability of courses. Please see advisor for further details.

Bioengineering (Z054)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Students in our Bioengineering degree programs will learn to integrate priciples of engineering and biological systems to develop new technologies and devices that improve human health, fight disease, and aid persons with disabilities. Our biomedical engineering masters program is uniquley positioned to offer educational strengths in engineering, biology, and medicine.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. Tuition and fees are subject to change.

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
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University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/bioengineering

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applicants	program not currently accepting applicants

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Bioengineering, Post-Baccalaureate Certificate (P.B.C.) (p. 79)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

This program is also offered 100% online. Please see Bioengineering (Z083) for more information.

Biological Resources Engineering, Master of Science (M.S.)

This program is not currently accepting applications.

Biological Resource Engineering, Doctor of Philosophy (Ph.D.)

This program is not currently accepting applications.

Biological Resources Engineering (ENBE)

Graduate Degree Program
College: Engineering

This program is not currently accepting applications. Please visit the Bioengineering (p. 74) program listing in this catalog.

Website: http://www.bioe.umd.edu

Relationships: Bioengineering (BIOE) (p. 74), Bioengineering (PMBI) (p. 78)

Admissions

This program is not currently accepting applications. Please visit the Bioengineering (p. 74) program listing in this catalog.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.bioe.umd.edu

Requirements

- Biological Resource Engineering, Doctor of Philosophy (Ph.D.) (p. 80)
- Biological Resources Engineering, Master of Science (M.S.) (p. 80)

Biological Sciences, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Students cannot be formally admitted into the M.S. program, but can earn the M.S. along the way to the Ph.D. Of the 30 credits required, 18 credits must be at the 600-level or above including BISI701 and BISI688B: Bioethics. Of the 30 credits required, 16 credits must be in Biological Sciences with at least three courses in a single area of specialization.

Course	Title	Credits
Core Requirements		
BISI701	Teaching & Professional Development in Biology	1
BISI688	(BISI688B - Bioethics)	1
Select 22 credits		22
Thesis or Non-Thesis Requirements		
Select one of the following:		6
Thesis:		
BISI799	Master's Thesis Research	
Non-Thesis:		
Complete a scholarly paper		
Total Credits		30

Biological Sciences, Doctor of Philosophy (Ph.D.)

The Ph.D. program in Biological Sciences is an interdepartmental umbrella research program that provides opportunities for students to develop scholarly, innovative, and independent work. Courses are designed to strengthen and complement the student's research. An advisory committee helps guide each student in selecting classes and other learning experiences. Students are encouraged to present their research at national and international meetings and to publish in peer reviewed journals. Seminar series featuring prominent scientists expose students to exciting topics and help students develop collaborative contacts. During the course of their studies, each student must pass a qualifying exam, complete and defend an original dissertation, and present that dissertation work in a seminar.

All students must complete the following requirements:

Course	Title	Credits
Core Requirements		
Select three credits of graduate seminar courses		3
Select nine credits of advanced coursework		9
Select one course in Bioethics		3
BISI701	Teaching & Professional Development in Biology	1
Specialization Requirements		
Select one of the following concentrations:		4-18
Behavior, Ecology, Evolution, and Systematics (BEES)		
Computational Biology, Bioinformatics, and Genomics (CBBG)		
Molecular and Cell Biology (MOCB)		
Physiological Systesms (PSYS)		
Dissertation Research Requirements		
BISI899	Doctoral Dissertation Research	12
Total Credits		32-46

Students choose from one of the following concentration options and complete the additional requirements in each:

Behavior, Ecology, Evolution, and Systematics (BEES)

Course	Title	Credits
BEES608	Seminar in Behavior, Ecology, Evolution and Systematics (BEES608A)	1
Approved Statistics course or quantitative course		3
Total Credits		4

Computational Biology, Bioinformatics, and Genomics (CBBG)

Course	Title	Credits
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG688Y - Bioinformatics and Genomics)	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG688P - Programming for Biology)	2
CBMG699	Special Problems in Cell Biology and Molecular Genetics (CBMG699D - Bioinformatics and Computation Biology Seminar Series)	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG688B - Bioethics)	1
Electives		5
Total Credits		12

Molecular and Cell Biology (MOCB)

Course	Title	Credits
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CMBG688D - Cell Biology I: Structure and Function)	2
BCHM661	Nucleic Acids I	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CMGB688F - Gene Expression)	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG6881 - Genetic Analysis)	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG688B - Bioethics)	2
Electives		8
Total Credits		18

Physiological Systems (PSYS)

Course	Title	Credits
Bioethics course		3
Graduate Seminar course		1-3
Three core graduate level courses		2-4
Statistics or quantitative course		3
Total Credits		9-13

Biological Sciences (BISI)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Biological Sciences (BISI) Graduate Program offers a wide range of training opportunities for students interested in pursuing doctoral level research in exciting, diverse areas across the biological sciences. BISI is an interdepartmental umbrella program that consists of four Areas of Concentration:

- Behavior, Ecology, Evolution, and Systematics (BEES)
- Computational Biology, Bioinformatics, and Genomics (CBBG)
- Molecular and Cell Biology (MOCB)
- Physiological Systems (PSYS)

Graduate students in BISI are associated with one of these areas, but their interests often span multiple concentrations, which allows the development of innovative research projects across traditional disciplinary boundaries. Descriptions of each Concentration Area, faculty research interests, and more detailed programmatic information are available at bisi.umd.edu.

Although the BISI Program is administered within the College of Computer, Mathematical, and Natural Sciences, it involves distinguished graduate faculty from multiple departments and Colleges at the University of Maryland as well as outstanding adjunct faculty from nearby research institutions. Students may have opportunities to

work with participating scientists from - as examples - the National Institutes of Health; Smithsonian Institution, including the National Museum of Natural History, the National Zoo, and Molecular Systematics Laboratory; the Food and Drug Administration; and the U.S. Department of Agriculture. BISI students have an incomparable wealth of potential research options and collaborations that extend from Maryland's College Park campus throughout the Washington D.C. metropolitan area.

Financial Assistance

Students are supported through fellowships, research assistantships, and/or teaching assistantships. Each type of funding provides a stipend, tuition remission, and access to health and dental insurance and a prescription drug plan. Historically, all students have been supported throughout their graduate careers.

Fellowships are offered on a competitive basis. There are no separate financial disclosure forms to fill out as part of the graduate application process.

Teaching assistantships require students to assist a faculty member in teaching a course or lab section(s). Benefits of teaching assistantships include building communication and organizational skills as well as resume enhancement for academic, government, or private sector jobs. It is also delightfully rewarding to explain concepts to students and then witness their excitement as ideas "click" and their questions are resolved.

Contact

Students are strongly encouraged to communicate directly with faculty in the area of their interest. Additional general information may be obtained by emailing bisi@umd.edu or by calling the Biological Sciences Graduate Office at 301-405-6905.

Please visit the Biological Sciences Graduate Program website, featuring a search engine to match research interests with faculty and links to all Concentration Areas: bisi.umd.edu

The Graduate School provides detailed information on International Student Admission here: http://gradschool.umd.edu/admissions/international-admissions and additional information for international graduate students is available on the International Students and Scholars website at http://globalmaryland.umd.edu/.

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Email: bisi@umd.edu

Website: http://www.bisi.umd.edu

Courses: BEES BIOL BIOM BISI BSCI CBMG ENTM MOCB

Relationships: Biochemistry (BCHM) (p. 72), Biophysics (BIPH) (p. 83), Chemistry (CHEM) (p. 116), Entomology (ENTM) (p. 186), Marine, Estuarine, and Environmental Sciences (MEES) (p. 283), Neurosciences and Cognitive Science (NACS) (p. 316)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationbisi.pdf)
- Publications/Presentations

All students applying to the Biological Sciences Graduate Program must have a Bachelor's degree from a recognized undergraduate institution. Applicants are expected to have a strong academic record, including coursework in advanced areas of biology as well as at least one year of calculus, general chemistry, organic chemistry, and physics. Able students with deficiencies in a particular area may be admitted and the deficiency corrected after enrollment. **Students are asked to identify a concentration area and research interests on the general application.**

To explore matches of your interests with those of BISI faculty, see the BISI website, bisi.umd.edu.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Dec

Other Deadlines: Please visit the program website at http://www.bisi.umd.edu

Requirements

- Biological Sciences, Doctor of Philosophy (Ph.D.) (p. 81)
- Biological Sciences, Master of Science (M.S.) (p. 80)

Facilities and Special Resources

The campus and local area provide students access to a vast array of instrumentation, equipment, facilities, and technologies to advance biological research. As examples, the college has state of the art facilities for research in all aspects of cell and molecular biology including cell and organism culturing, protein and nucleic acid analyses, peptide sequencing, oligonucleotide synthesis and sequencing, fluorescence, confocal microscopy, scanning and transmission electron microscopy, computer graphics for molecular modeling, NMR, mass-

spectroscopy, and X-ray diffraction. Students have access to a laboratory for evolutionary molecular sequence analysis; gas source stable isotope mass spectrophotometer; bioacoustic lab; flume lab; GIS (graphic information systems) lab; and high-speed network access to a wide range of desktop and super-computing facilities. Greenhouses and animal care facilities are available.

We also have several state-of the-art shared instrumentation laboratories. Two center around biological imaging for both electron and light microscopy, including a field-emission scanner and an image reconstruction/deconvolution microscope. Another shared laboratory augments existing sequencing facilities on campus, enabling large-scale processing and sequencing of nucleic acids, with multiple robotic sequenators and real time PCR. Other core facilities provide instrumentation for fluorescence-activated cell sorting (FACS), NMR, mass spectrometry, and microarray technology. Equipment and analytical instruments are available in both faculty and core laboratories for the maintenance of animal and plant tissue cultures, for the production of monoclonal antibodies, for the synthesis and micro-analysis of proteins, for large-scale fermentation and cultivation of microorganisms, and for computer assisted molecular modeling. Support staffing in shared instrumentation facilities is provided by the college, and maintenance costs have been subsidized by the college, thereby providing even occasional users with appropriate training and access, and simultaneously keeping instrument use costs low. This strategy provides exceptional opportunities for research and training, and enables graduate students to perform experiments with instrumentation that is at the leading edge of biological technology.

Students have access to the Smithsonian National Museum and USDA collections of living and preserved organisms.

LIBRARY FACILITIES

The library facilities on campus, as well as their online accessibility, are outstanding. In addition, there are libraries in the local area with specialized collections. The most important are the National Agricultural Library, the Library of Congress, the National Library of Medicine, and the Smithsonian Institution Library. Thus, the University of Maryland's region contains perhaps the most comprehensive collections of books and journals in the world.

Biophysics, Master of Science (M.S.)

Thesis option: 30 credits required
Non-thesis option: 30 credits required

Course	Title	Credits
Core Requirements		
BIPH699	Research in Biophysics	4
BIPH698	Biophysics Seminar (BIPH698L)	2
Advanced course		3
Oral Presentation		
Remainder of Coursework		15
Thesis or Non-Thesis Option		
Select one of the following:		6
Thesis:		
BIPH799	Master's Thesis Research	
Non-Thesis:		
Submit a scholarly paper and pass the qualifying examination at the M.S. level		
Total Credits		30

Biophysics, Doctor of Philosophy (Ph.D.)

Doctoral students are required to pass a qualifying exam, submit and present a candidacy paper, as well as complete the following courses:

Course	Title	Credits
Core Requirements		
BIPH698	Biophysics Seminar	2
BIPH699	Research in Biophysics	4
Dissertation Research Requirements		
BIPH899	Doctoral Dissertation Research	12
Total Credits		18

One course, Research in Biophysics, which consists of three seven week rotations through three experimental or theoretical research groups, is required of all students. A short presentation must be made to all students at the end of each rotation. Students must meet and report their progress to a three-person mentoring committee starting with the first semester. A qualifier exam must be passed. Admission to candidacy is granted after the successful presentation of a research proposal to the Program Director and the three-member committee. A dissertation must be written and defended before a committee.

Biophysics (BIPH)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Biophysics Program in the Institute for Physical Science and Technology offers Ph.D. degrees in Biophysics. It is affiliated with the College of Computer, Mathematical and Natural Sciences, and the College of Engineering. Doctoral degrees are offered.

The Maryland Biophysics Program aims to train graduate students in the use of theoretical, computational, and experimental methods to gain quantitative insights into biological systems. The post genomic era is bringing tools for unprecedented characterization and control of living systems. To fully harness these tools for quantitative insights in biology, biomedicine, and bioengineering requires expertise from a number of disciplines. Thus our program includes faculty from Chemistry, Physics, Biology, Materials Science and Bioengineering. The Biophysics Program is open to students with undergraduate degrees in chemistry, physics or biology as well as students with majors in mathematics, computational science or engineering. Because student backgrounds are diverse, we tailor the curriculum to suit the needs of the individual. The online application is located at apra@umd.edu.

Research areas include Membranes and channels, Theory of molecular machines and motors, Cell mechanics, Motility and the cytoskeleton, Theoretical studies of protein and RNA folding and aggregation, Single molecule biophysics, Theory of hydrophobic and electrostatic interactions Scattering Techniques in RNA and Polymers Protein Structure, Nonlinear dynamics and biophysics of biological regulation, Mechanisms of allostery and protein assembly. The core courses

that include but are not limited to Statistical Mechanics, Chemical Thermodynamics, Biophysical Chemistry, Membrane Biophysics and Cell Biology, constitute the basis for further specialization.

Financial Assistance

TAships, RAships, Fellowships, arrangements for support from the National Institutes of Health.

Contact

Sergei Sukharev
Professor and Biophysics Program Director
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4094 Campus Drive
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Telephone: 301.405.6923
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Souad Nejjar
Program Coordinator
2123 Institute for Physical Science & Tech
8108 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.9307
Fax: 301.314.9404
Email: snejjar@umd.edu

Website: http://www.marylandbiophysics.umd.edu

Courses: BCHM BIOE BIOL BIPH BSCI CHEM ENMA PHYS

Relationships: Chemical Physics (CHPH) (p. 115), Chemistry (CHEM) (p. 116), Materials Science and Engineering (ENMA) (p. 286), Physics (PHYS) (p. 326)

Admissions
General Requirements

- Statement of Purpose: In addition to the questions requested by the Graduate School, applicants should include content, both backwards and forwards looking, about their interests in the University of Maryland's Biophysics Ph.D. program
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations

Students dedicated to a career in experimental or theoretical biophysics are sought.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	3 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	3 Jan

Other Deadlines: Please visit the program website at http://www.marylandbiophysics.umd.edu

Requirements

- Biophysics, Doctor of Philosophy (Ph.D.) (p. 83)
- Biophysics, Master of Science (M.S.) (p. 83)

Facilities and Special Resources

Eleven of the eighteen faculty run experimental laboratories. Multiple experiments are conducted at the same time with graduate students working on the experiments. A Biophysics Seminar is run on the average of once a week, generally given by visiting scholars. For those students electing to take the Seminar for credit, one credit is offered, and these students must sign in each week. Faculty form three-person committees to mentor students, as mentioned above. Symposia consisting of about six nationally and internationally known scholars are conducted once a semester on various topics. These are well attended by students, postdocs, faculty and visitors from local institutions such as NIH and Johns Hopkins.

Biostatistics, Master of Public Health (M.P.H.)

Non-thesis only: 45 credits

Course	Title	Credits
Core Requirements		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
EPIB697	Public Health Data Management	3
EPIB651	Applied Regression Analysis	3
EPIB652	Categorical Data Analysis	3
EPIB655	Longitudinal Data Analysis	3
EPIB653	Applied Survival Data Analysis	3
EPIB778	Internship in Public Health	4
EPIB786	Capstone Project in Public Health	3

	9
Total Credits	45

Biostatistics (BIOS)

Graduate Degree Program
College: Public Health

Abstract

Biostatistics is a science that addresses theory and techniques for describing, analyzing, and interpreting health data. The discipline is primarily focused on applications to problems in the health, medical, and biological sciences. The MPH with a concentration in biostatistics is a 43 credit professional degree that prepares graduates to work in public health services as practitioners, researchers, administrators, and consultants. A full-time student may complete our program in 2 years. Part-time students may take up to 4 years. The majority of courses are offered in the evenings. In addition to coursework, all biostatistics masters' students are required to complete a capstone experience that occurs after all courses are completed and includes:

1. a data analysis project and
2. an internship of at least 240 hours.

Our proximity to the nation's capital offers students unparalleled opportunities for research experiences in public health, including placements at the National Institutes of Health, National Center for Health Statistics, Centers for Disease Control, Food and Drug Administration, the Maryland Department of Health and Mental Hygiene, and many other national, state, and local health agencies.

CONTACT

Brit I. Saksvig, Ph.D.
Director of Graduate Studies
Department of Epidemiology and Biostatistics
2234 School of Public Health Building
4200 Valley Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2491
Email: bsaksvig@umd.edu

Website: http://sph.umd.edu/department/epib

Courses: EPIB

Relationships: Behavioral and Community Health (BCHL) (p. 68), Behavioral and Community Health (MBCH) (p. 70), Environmental Health Sciences (MIEH) (p. 191), Epidemiology (EPDM) (p. 195), Epidemiology (EPID) (p. 196), Health Administration (HLSA) (p. 230), Health Equity (HLEQ) (p. 231), Health Policy Analysis and Evaluation (HPAE) (p. 232), Maternal and Child Health (MCHS) (p. 290)

Admissions

Applications for the MPH program with concentration in Biostatistics are reviewed with consideration to the following criteria:

1. Minimum 3.0 undergraduate GPA; outstanding performance in quantitative-oriented courses
2. Official GRE scores taken within the past 5 years (GRE scores are required and should be requested directly from ETS for electronic transmission to SOPHAS. Use the SPH code 0485 and the Graduate School Code 5814). Scores should be at least in the 50th percentile for all sections.
3. 3 letters of recommendation that address your academic capabilities.
4. Statement of Purpose: Your statement of purpose should address each of the following questions:
   a. describe your specific interest in biostatistics;
   b. what previous experiences have influenced your decision to pursue a degree in biostatistics; and
   c. how do you believe UMD's program will help you reach your career goals.
5. Relevant academic/work experience, including previous coursework in mathematics, statistical methods, and/or statistical software packages.

The University of Maryland requires a Supplemental Application and a Supplemental Application Fee of $75 for each program. Applicants will receive e-mail instructions for how to complete the Supplemental Application once your SOPHAS application is complete. **Applicants to the MPH program with concentration in Biostatistics should be sure to use the major code BIOS when selecting the program on the Supplemental Application.**

How to Apply: Applications should be submitted through the Schools of Public Health Application Service (SOPHAS) at www.SOPHAS.org (https://sophas.org). Remember to designate the University of Maryland School of Public Health, College Park, as one of your school choices along with your desired program. The University of Maryland School of Public Health GRE Code in SOPHAS is 0485 (the GRE is required in all applications).

For information please see http://sph.umd.edu/content/graduate-admissions.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Priority Consideration: 14 Dec / Final: 12 April
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority Consideration: 14 Dec / Final: 15 Feb

Other Deadlines: Please visit the program website at http://sph.umd.edu/department/epib

Requirements

- Biostatistics, Master of Public Health (M.P.H.) (p. 84)

Facilities and Special Resources

Our faculty in the Department of Epidemiology and Biostatistics includes individuals with multi-faceted interests in biostatistics, epidemiology, and bioinformatics. Biostatistics faculty apply statistical techniques including survival and longitudinal analysis, computational statistics, statistical analysis of genomic and proteomic data, machine learning, neuroimaging statistics, (network) meta-analysis, missing data analysis, Bayesian hierarchical methods, and bioinformatics to analyze and interpret health data. Epidemiology faculty have research interests

and expertise in the epidemiology of infectious disease and chronic disease with particular focus in the areas of HIV/STIs, cancer, health disparities, cardiovascular disease, obesity/physical activity, and sexual and reproductive health. Additional areas of specialization include social and behavioral determinants of health, aging, cultural competency, and community-based interventions.

Business Administration and Accounting, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.)

Non-thesis only: 66 credits required

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students must complete all required courses for both programs and reach a total of 66 credits. Students complete 36 credits of Business courses and 30 credits of Accounting courses. Part-time MBA students complete the **BUSI** designated courses.

Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
MBA Electives approved by advisor		14
Accounting core courses		12
Accounting specialization courses		18
Total Credits		66

Business Administration and Accounting (BAAC)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741

PhD Admissions Office: 301.405.2214

Admission criteria for the MS program focusing in accounting are based on: quality of undergraduate and graduate coursework; 1 letter of recommendation; professional experience; video submission; and written essay of objectives. Prospective applicants may contact the program at 301.405.2559 for information regarding the MS program.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Rolling	Rolling
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Rolling	Rolling

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Administration and Accounting, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.) (p. 86)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration, Master of Business Administration (M.B.A.)

Non-thesis only: 54 credits required

The Robert H. Smith School of Business offers an MBA program designed to provide the educational foundation for those students with the potential to exhibit the highest degree of excellence in future careers as professional managers. The MBA program requires 54 credits of coursework, which is normally four semesters for a full-time student. There is no thesis requirement. Successful students in the program are expected to demonstrate the following:

1. a thorough and integrated knowledge of the basic tools, concepts, and theories relating to professional management;
2. behavioral and analytical skills necessary to deal creatively and effectively with organizations and management problems;
3. an understanding of the economic, political, technological, and social environments in which organizations operate;
4. a sense of professional and personal integrity and social responsibility in the conduct of managerial affairs both internal and external to the organization.

Students whose cumulative grade point average falls below 3.0 will be placed on probation and will be given a specified amount of time to raise the average to a 3.0. Failure to do so will result in academic dismissal from the program. Maryland MBA graduates obtain employment in a wide spectrum of organizations at highly competitive starting salaries.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Please note: MBA students are required to complete a minimum of 22 core credits of required courses. The number of required credits could increase due to program design and some courses having variable credits between 2 and 3. Please consult with your program advisor before registering for required courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved by advisor		32
Total Credits		54

Business Administration (BMBA)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems

(MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial aid is available to qualified full-time and Executive MBA students in the form of fellowships, graduate assistantships, and scholarships.

Contact

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Courses: BMGT BUAC BUDT BUFN BULM BUMK BUMO BUSI

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Admission criteria for the MBA program are based on: quality of undergraduate and graduate coursework; score on the GMAT or GRE; 1 letter of recommendation; professional experience; and written essay of objectives. Prospective applicants may contact the program at 301.405.2559 for information regarding the MBA program.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	See program website	See program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	See program website	See program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Administration, Master of Business Administration (M.B.A.) (p. 87)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

The University of Maryland Robert H. Smith School of Business is approved to operate in the District of Columbia by the Washington, DC Higher Education Licensure Commission.

Business Administration Executive, Master of Business Administration (M.B.A.)

Non-thesis only: 54 credits required

Course	Title	Credits
Core Requirements		
EMBA616	Accounting for Senior Management	3
EMBA630	Data Models and Decisions	3
EMBA640	Financial Management	3
EMBA758	Special Topics (EMBA758D - Leadership and Human Capital)	3
EMBA758	Special Topics (EMBA758X - Managerial Economics)	3

EMBA758	Special Topics (EMBA758C - Global Economics)	3
EMBA758	Special Topics (EMBA758S - Strategic Management)	3
EMBA758	Special Topics (EMBA758F - Operations Management)	3
EMBA757	Marketing Strategy	3
EMBA621	Strategic and Transformational Information Technology	3
Electives	EMBA6xx or 7xx	24
Total Credits		54

Business Administration (Executive) (CMBA)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial aid is available to qualified full-time and Executive MBA students in the form of fellowships, graduate assistantships, and scholarships.

Contact

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu.

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742

Telephone: 301.405.2559
Email: execed@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Courses: BMGT BUAC BUDT BUFN BULM BUMK BUMO BUSI

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/executive-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Admission criteria for the EMBA program are based on: quality of undergraduate and graduate coursework; 1 letter of recommendation; professional experience; and written essays of objectives. Prospective applicants may contact the program at 301.405.2386 for information regarding the EMBA program.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	See program website	See program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	See program website	See program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Administration Executive, Master of Business Administration (M.B.A.) (p. 88)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration Executive, Master of Business Administration (M.B.A.)

Non-thesis only: 54 credits required

The EMBA program is designed for mid-career professionals to high-level executives who desire a systemic approach to managing and leading corporate functions. Admission to the EMBA program is highly competitive and is based on significant and relevant professional and managerial work experience, prior academic performance, and personal attributes. The Robert H. Smith School of Business seeks to attract an internationally and professionally rich student population, diverse across industry and functional expertise.

Course	Title	Credits
Core Requirements		
EMBA690	Strategic Management	2
EMBA630	Data Models and Decisions	3
EMBA681	Managerial Economics and Public Policy	2
EMBA637	Corporate Finance	4
EMBA656	Leadership and Human Capital	3
EMBA789	Leadership Mastery	13
EMBA610	Introduction to Financial Accounting	2
EMBA757	Marketing Strategy	3
EMBA611	Managerial Accounting	2
EMBA683	The Global Economic Environment	2
EMBA694	Operations Management	2
Electives	EMBA6xx or 7xx	16
Total Credits		54

Business Administration (Executive) (EMBA)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial aid is available to qualified full-time and Executive MBA students in the form of fellowships, graduate assistantships, and scholarships.

Contact

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: execed@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Courses: BMGT BUAC BUDT BUFN BULM BUMK BUMO BUSI

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/executive-mba/admissions https://www.rhsmith.umd.edu/programs/executive-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Admission criteria for the EMBA program are based on: quality of undergraduate and graduate coursework; 1 letter of recommendation; professional experience; and written essays of objectives. Prospective applicants may contact the program at 301.405.2386 for information regarding the EMBA program.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	See program website	See program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	See program website	See program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Administration Executive, Master of Business Administration (M.B.A.) (p. 90)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Finance, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.Fin.)

Non-thesis only: 66 credits required

Students complete 36 credits of Business courses and 30 credits of Finance courses. Students can specialize in either Corporate Finance, Asset Management, Risk Management, or General Finance.

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students must complete all required courses for both programs and reach a total of 66 credits.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
MBA Electives approved by advisor		14
Finance core courses		12
Finance specialization courses		18
Total Credits		66

Business Administration and Finance (BAFN)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat

competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https: (https://www.rhsmith.umd.edu/programs/full-time-mba/admissions)/ (http://www.rhsmith.umd.edu)/www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Administration and Finance, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.Fin.) (p. 91)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Information Systems, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.)

Non-thesis only: 66 credits required

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students must complete all required courses for both programs and reach a total of 66 credits.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
MBA Electives approved by advisor		14

Information Systems core courses	12
Information Systems specialization courses	18
Total Credits	66

Business Administration and Information Systems (BAIS)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Administration and Information Systems, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.) (p. 92)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Marketing Analytics, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.)

Non-thesis only: 66 credits required

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain

management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students complete **66 total credits** including 36 credits of Business courses and 30 credits of Marketing Analytics courses.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
MBA Electives approved by advisor		14
Marketing Analytics core courses		12
Marketing Analytics specialization courses		18
Total Credits		66

Business Administration and Marketing Analytics (BAMA)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Administration and Marketing Analytics, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.) (p. 93)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Nursing, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.)

The dual degree requires **42 credits** of Business courses. The remaining coursework is completed at the University of Maryland, Baltimore. Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Students are eligible to pursue a joint degree through the Robert H. Smith School of Business and the University of Maryland School of Nursing, located in Baltimore, Maryland. Information about the Nursing Program can be found at http://nursing.umaryland.edu/

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved by advisor		20
Total Credits		42

Business Administration and Nursing, Master of Business Administration and Doctor of Philosophy (dual degree) (M.B.A. and Ph.D.)

Students are eligible to pursue a joint degree through the Robert H. Smith School of Business and the University of Maryland School of Nursing, located in Baltimore, Maryland. Information about the Nursing Program can be found at http://nursing.umaryland.edu/

Business Administration and Nursing (BNRS)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland

College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Administration and Nursing, Master of Business Administration and Doctor of Philosophy (dual degree) (M.B.A. and Ph.D.) (p. 95)
- Business Administration and Nursing, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.) (p. 95)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration (Online), Master of Business Administration (M.B.A.)

Non-thesis only: 54 credits required

Select an MBA specialization in Finance, Supply Chain Management, Information Systems and Business Analytics, Accounting or Marketing, or choose the general track that introduces you to the core concepts of each specialization. Earn your MBA online in as few as under 2 years while remaining active in your current career. Engage in education online through a flexible, user-friendly learning environment recognized as one of the best in the marketplace.

Course	Title	Credits
Core Requirements		
EMBA778	Special Topics (Fundamentals of Business)	2
EMBA778	Special Topics (Entrepreneurship)	2
EMBA620	Strategic Information Systems	2
EMBA656	Leadership and Human Capital	3
EMBA610	Introduction to Financial Accounting	2
EMBA681	Managerial Economics and Public Policy	2
EMBA640	Financial Management	3
EMBA693	Supply Chain	2
EMBA683	The Global Economic Environment	2
EMBA757	Marketing Strategy	3
EMBA611	Managerial Accounting	2
EMBA694	Operations Management	2
EMBA630	Data Models and Decisions	3
EMBA678	Ethical Leadership	2
EMBA654	Organizational Change	3
EMBA778	Special Topics (International Business)	2
EMBA778	Special Topics (Strategic Management)	3
EMBA778	Special Topics (Executive Powers and Negotiation)	2
EMBA798	Action Learning Project	1
EMBA778	Special Topics (Action Learning Project II)	3
EMBA778	Special Topics (Capstone: Integrative Business Simulation)	2
Specialization Requirements		
Select 6 credits in one of the following specializations:		6
Marketing		
Information Systems and Business Analytics		
Accounting		
Finance		
Supply Chain Management		
General Track		
Total Credits		54

Business Administration (online) (OMBA)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial support may be available to qualified online MBA students in the form of scholarship.

Contact

Smith online MBA admissions can be reached at 877-807-8741 or admissions@onlineprograms.umd.edu. Additional information about the program and admissions requirements can be found at http://onlinemba.umd.edu/.

Online MBA Admissions
Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 877.807.8741
Email: admissions@onlineprograms.umd.edu

Website: http://onlinemba.umd.edu/

Courses: BMGT BUAC BUDT BUFN BULM BUMK BUMO BUSI

Admissions

We strongly encourage you to visit the Smith online MBA program website at http://onlinemba.umd.edu/. Additionally the Smith School website http://www.rhsmith.umd.edu/ contains a wealth of information regarding all graduate business programs and their admissions processes.

Smith Online MBA Admissions Information: 877.807.8741

Admission criteria for the Online MBA program can be found at http://onlinemba.umd.edu/.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department's website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department's website

Other Deadlines: Please visit the program website at http://onlinemba.umd.edu/

Requirements

- Business Administration (Online), Master of Business Administration (M.B.A.) (p. 96)

Facilities and Special Resources

The Office of Career Services (OCS) serves as partner for students future success. Whether it's advancing confidently through a student's current organization or taking the leap to transition careers, Smith's OCS is here to help. The OCS provides students with access to:

- One-on-one career coaching: Appointments are available throughout the lunch hours and into the evening to accommodate our busy professionals' work schedules. Students have the option of meeting in person or remotely to cover a wide range of career-related topics.
- Assessment tools to identify career interests and strengths, and provide insight into development needs and potential business career options.
- Career exploration resources including a library of industry-specific videos and webinars, as well as business directories, articles and career guides with insider information.
- The UMD Alumni Network
- An automated job posting, application and interview scheduling system, and access to MBA-Exchange, which provides information on MBA-level opportunities throughout the country and globally.
- Opportunities to network with students and alumni from the broader Smith MBA community, and more!
- Note: OCS services may be subject to change.

Business Administration and Pharmacy, Master of Business Administration and Doctor of Pharmacy (Dual Degree) (M.B.A. and Pharm.D.)

The dual degree requires **42 credits** of Business courses. The remaining coursework is completed at the University of Maryland, Baltimore. The total combined credits will be **176 credits**, 42 from the Smith School of Business and 134 from the School of Pharmacy.

The combined program takes advantage of the Smith School of Business core courses while adding the School of Pharmacy PharmD degree requirements as an area of specialization. In this program the students would have the opportunity to take Smith School of Business or the School of Pharmacy electives at standard costs, specific to each college, to further establish an area of specialization and to satisfy the credit requirements for both the MBA and PharmD program degrees.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved by advisor		20
Total Credits		42

Business Administration and Pharmacy (BPHR)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

Students must apply to each institution for admission. The Smith School of Business and the School of Pharmacy will use separate application processes for admission purposes. Students must meet the entrance requirements of both institutions. Furthermore, once admitted into the program, students will be subject to the rules and conditions of both institutions about acceptable academic performance, reasonable progress toward completion of the degree, and standards of ethical conduct.

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the program website
International Applicants	

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website

Other Deadlines: Please visit the program website at http://rhsmith.umd.edu

Requirements

- Business Administration and Pharmacy, Master of Business Administration and Doctor of Pharmacy (Dual Degree) (M.B.A. and Pharm.D.) (p. 97)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Public Policy, Master of Business Administration and Master of Public Policy (Dual Degree) (M.B.A. and M.P.P.)

Students complete **66 total credits** including at least 30 credits of Business courses, and at least 30 credits of Public Policy courses.

The University of Maryland Robert H. Smith School of Business and the School of Public Policy (both located in Van Munching Hall) offer a dual program of studies leading to both the MPP and MBA degrees in less time (typically 5 or 6 semesters) and at less cost than if the degrees were obtained separately.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved by advisor		8-14
Public Policy courses		30
Total Credits		60-66

Business Administration and Public Policy (BMPO)

Graduate Degree Program
College: Business / Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu or http://www.publicpolicy.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)
- An applicant needs to be admitted to both schools in order to enroll in this program.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred: 17 Jan / Final: 16 May	15 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu or http://www.publicpolicy.umd.edu

Requirements

- Business Administration and Public Policy, Master of Business Administration and Master of Public Policy (Dual Degree) (M.B.A. and M.P.P.) (p. 99)

Business Administration and Real Estate Development, Master of Business Administration and Master of Real Estate Development (Dual Degree) (M.B.A. and M.R.E.D.)

Non-thesis only (capstone required): 74 credits

Course	Title	Credits
Core Requirements		
Business courses		22
Business electives		20
RDEV courses		32
Total Credits		74

Business Administration and Real Estate Development (MBRE)

Graduate Degree Program
College: Business / Architecture

Abstract

The dual degrees combines coursework from the Graduate real estate and business management programs to enable a student to complete both the Master of Business Administration and Master of Real Estate Development degrees with fewer total credits than it would take to complete the two separately and sequentially.

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with

the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Contact

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Relationships: Business Administration (BMBA) (p. 87), Business Administration and Pharmacy (BPHR) (p. 98), Real Estate Development (RDEV) (p. 351)

Admissions

Applications for the dual degree program will have their application assessed by each program individually, and may be admitted to one or the other, but not necessarily both programs. If both programs review committees agree to offer admission to their program than a student could proceed on the dual degree track.

For current students enrolled in either program, contact your applicable program director for directions on how you might proceed to enroll in the dual degree program.

School of Business admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions Please contact Maria Day-Marshall at mdaymars@umd.edu for the School of Architecture, Planning, and Preservation's admissions requirements.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu or http://www.arch.umd.edu

Requirements

- Business Administration and Real Estate Development, Master of Business Administration and Master of Real Estate Development (Dual Degree) (M.B.A. and M.R.E.D.) (p. 100)

Business Administration and Social Work, Master of Business Administration and Master of Social Work (Dual Degree) (M.B.A. and M.S.W.)

Students complete **90 total credits** including 39 credits of Business courses. The remaining coursework is completed at the University of Maryland, Baltimore. Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

This program provides a unique combination of skills for those who wish to become managers of social service agencies. Elective courses can be taken at either the School of Social Work, University of Maryland, Baltimore, or at the Robert H. Smith School of Business. This program requires 90 total credit hours for graduation and can be completed in three years. More information on the School of Social Work can be found at http://www.ssw.umaryland.edu

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved by advisor		17
Total Credits		39

Business Administration and Social Work (BMSW)

Graduate Degree Program

College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu.** The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council. The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Supply Chain Management

Non-thesis only: 66 credits required

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students complete **66 total credits** including 36 credits of Business courses and 30 credits of Supply Chain Management courses.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2

BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
MBA Electives approved by advisor		14
Supply Chain Management core courses		12
Supply Chain Management specialization courses		18
Total Credits		66

Business Administration and Supply Chain Management (BASC)

Graduate Degree Program
College: Business

ABSTRACT

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions

2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Administration and Supply Chain Management (p. 102)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Analytics, Master of Science (M.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
Core Requirements		
BUSI630	Data Driven Decision Making	2
BUDT732	Decision Analytics	2
BUDT733	Data Mining and Predictive Analytics	2
BUDT704	Database Management Systems	2
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758X: Capstone Project in Operations Analytics)	3
Electives		19
Total Credits		30

Business Analytics, Master of Science (M.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
Core Requirements		
BUSI630	Data Driven Decision Making	2
BUDT732	Decision Analytics	2
BUDT733	Data Mining and Predictive Analytics	2
BUDT704	Database Management Systems	2
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758X: Capstone Project in Operations Analytics)	3
Electives		19
Total Credits		30

Business Analytics (BMAN)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

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Contact

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/ms-business-analytics/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the program website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website

Other Deadlines: Please visit the program website at http://rhsmith.umd.edu

Requirements

- Business Analytics, Master of Science (M.S.) (p. 104)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic **MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.**

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Analytics (online) (OMAN)

Overview

Graduate Degree Program
College: Business

ABSTRACT

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559

Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/ms-business-analytics/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the program website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website

Other Deadlines: Please visit the program website at http://rhsmith.umd.edu

Requirements

- Business Analytics, Master of Science (M.S.) (p. 104)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic **MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.**

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business and Management, Master of Science (M.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
BUSI610	Introduction to Financial Accounting	2
BUSI630	Data Driven Decision Making	2

BUSI640	Corporate Finance	2
BUSI650	Marketing Management	2
BUSI662	Leadership and Teamwork	2
BUSI681	Managerial Economics and Public Policy	2
BUSI690	Strategic Management	2
Electives approved with advisor		16
Total Credits		30

Business and Management (BMSB)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Contact

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions Requirements can be found here: https://www.rhsmith.umd.edu/programs/ms-business-management/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the program website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business and Management, Master of Science (M.S.) (p. 105)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business and Management, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 42 credits of coursework, in addition to 12 credits of BMGT899.

Course	Title	Credits
Core Requirements		
Major field courses		18
Research Tools courses		12
Minor field courses		12
Dissertation Research Requirements		

BMGT899	Doctoral Dissertation Research	12
Total Credits		54

Smith PhD is a full-time program designed to produce outstanding scholars in management-related disciplines. The primary goal is to place graduates in academic tenure-track faculty position at research academic institutions. Thus, a strong research philosophy pervades the entire program. The low student-to-faculty ratio fosters a high degree of interaction between faculty and students on research projects of mutual interest, frequently culminating in journal articles. Students whose career aspirations are congruent with the program's research orientation can look forward to a learning experience that is not only demanding but also stimulating and enriching.

Students should complete course work within 2 years of the program and sit for a qualifying or comprehensive exam (or both) within those 2 years. Course requirements total 42 credits. The exam will determine whether the student should continue in the program. Students must successfully pass their exams, paper requirements and complete all course work before they are eligible for advancement to candidacy. Students will complete 2 teaching requirements (as instructor) upon completion of course work. Additionally, students must propose their dissertation no later than May 31st of their fourth year, which designates the fifth year for the job market and completion of the dissertation.

98% of our students receive funding from Smith PhD. Students not funded by the program are typically funded by government or military scholarships, which are guaranteed for five years. Applications are considered first for quality with the assumption that funding is required from Smith PhD. Only after rendering an admissions decision will funding be considered and evaluated. Information about financial support is located on our website (https://www.rhsmith.umd.edu/programs/phd-program/admissions/financial-support).

Graduates of the program have accepted positions at various academic institutions including: Boston College, College of William and Mary, Cornell University, Columbia University, Georgetown University,Georgia Institute of Technology, Harvard, Hong Kong University of Science and Technology,Indiana University, Instituto de Empresa (Madrid), Lehigh University, McGill University, National Taiwan University, National University of Singapore, Notre Dame, Penn State University, Rensselaer Polytechnic Institute, Southern Methodist University, Syracuse University, Texas A & M University, University of Houston, University of California (Davis), University of California (Los Angeles), University of Southern California, University of Texas, University of Washington, University of Wisconsin, and Vanderbilt University.

For more information about each field of study please visit the website (https://www.rhsmith.umd.edu/programs/phd-program).

Business and Management (BPHD)

Graduate Degree Program
College: Business

Abstract

Founded in 1856, the University of Maryland is located on 1,250-acre suburban campus eight miles from Washington, D.C. and 35 miles from Baltimore. Washington, D.C. and the surrounding region offers unparalleled professional opportunities as well as a rich culture and recreational resources. This region is home to numerous federal agencies, universities, global corporations, and national and international nonprofit organizations. Robert H. Smith School of Business is one of 13 schools and colleges at the University of Maryland - one of the top-20 public research universities. This powerful combination makes Smith the ideal place to pursue a business doctoral degree.

The primary mission of Smith PhD is to produce individuals who will contribute to the discovery and dissemination of scientific knowledge through continued careers in research, publishing, and teaching at high quality research-oriented universities and research-oriented non-academic institutions throughout the world. In carrying out this mission, it is recognized that we operate in a knowledge-based economy that is being transformed by information technology.

We offer 9 fields of study, which require individual application:

- Accounting and Information Assurance
- Finance
- Information Systems
- Managerial Economics
- Marketing (Behavioral and Quantitative)
- Organizational Behavior/Human Resource Management
- Operations Management/Management Science
- Supply Chain Management
- Strategic Management & Entrepreneurship

Financial Assistance

Financial support is available to doctoral students in the form of fellowships, graduate assistantships, and scholarships.

Contact

Smith Doctoral Programs
3330 Van Munching Hall
College Park, MD 20742
Telephone: 301.405.2214
Fax: 301.314.9611
Email: businessphd@rhsmith.umd.edu

Website: (businessphd@rhsmith.umd.edu) **http://www.rhsmith.umd.edu/doctoral**

Courses: BMGT

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Writing Sample(s) (optional)
- Publications/Presentations (optional)

Prospective applicants may call (301) 405-2214 or email businessphd@rhsmith.umd.edu for information regarding the Ph.D. program.

For more admissions information or to apply to the program, please visit our Graduate School

Website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	3 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	3 Jan

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu/doctoral

Requirements

- Business and Management, Doctor of Philosophy (Ph.D.) (p. 106)

Facilities and Special Resources

The Robert H. Smith School of Business offers a PhD Program Suite, where every student has access to office space and supplies. Students have access to software and research computing tools.

Business Management and Law, Master of Business Administration and Juris Doctorate (Dual Degree) (M.B.A. and J.D.)

Students complete **109 total credits** including 33 credits of Business courses. The remaining coursework is completed at the University of Maryland, Baltimore. Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Twenty-one credits of law will be substituted for MBA elective coursework. Grade point averages in each program will be computed separately and students must maintain minimum standards in each school to continue in the program. The Graduate School will not accept transfer credit from coursework taken outside the joint program.
A student must complete both programs satisfactorily in order to receive both degrees. The MBA and the JD degrees must be awarded simultaneously. A student whose enrollment is terminated in one program may elect to complete work for the degree in which he or she remains enrolled, but such completion must be upon the same conditions as required of regular (nonjoint program) degree candidates. Student programs must be approved by the law school adviser for the joint program and the Associate Dean for Masters Programs. For further discussion of admission and degree requirements, students should see the above and consult the entry in the University of Maryland School of Law catalog.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Strategic and Transformational IT	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved with advisor		11
Total Credits		33

Business Management and Law (LMBA)

Graduate Degree Program
College: Business

ABSTRACT

The Robert H. Smith School of Business and the University of Maryland School of Law in Baltimore offer a joint program of studies leading to MBA and JD degrees. Under the terms of the joint program, a student may earn both degrees in four academic years. The accelerated program is possible because some courses can be credited toward both degrees. Candidates must apply for admission to the Law School as well as to the MBA program at College Park and must be admitted to both programs. Information about the JD program can be found at http://www.law.umaryland.edu/index.html.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/full-time-mba/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicant		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Business Management and Law, Master of Business Administration and Juris Doctorate (Dual Degree) (M.B.A. and J.D.) (p. 108)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Chemical and Biomolecular Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
ENCH610	Chemical Engineering Thermodynamics	3
ENCH620	Methods of Engineering Analysis	3
ENCH630	Transport Phenomena	3
ENCH640	Advanced Chemical Reaction Kinetics	3
Electives approved by advisor		18
Total Credits		30

Chemical and Biomolecular Engineering (PMCH)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

From biological engineering to nanotechnology, our Chemical and Biomolecular degree programs provide students with a fundamental understanding of physical, chemical, and biological processes. Courses also empower students to apply this knowledge to products and the processes by which they are made.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712

Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/chemical-biomolecular.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

[1] CHBE301, CHBE302, CHBE422, CHBE424 are equivalent.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Chemical and Biomolecular Engineering, Master of Engineering (M.Eng.) (p. 109)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Chemical and Biomolecular Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. Please see this program's specific course requirements at: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
ENCH620	Methods of Engineering Analysis	3
ENCH630	Transport Phenomena	3
ENCH610	Chemical Engineering Thermodynamics	3
or ENCH640	Advanced Chemical Reaction Kinetics	
Select one additional course approved by the program advisor		3
Total Credits		12

Chemical and Biomolecular Engineering (Z055)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

From biological engineering to nanotechnology, our Chemical and Biomolecular degree programs provide students with a fundamental understanding of physical, chemical, and biological processes. Courses also empower students to apply this knowledge to products and the processes by which they are made

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. Tuition and fees are subject to change.

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education

2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/chemical-biomolecular.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

[1] CHBE301, CHBE302, CHBE422, CHBE424 are equivalent.)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Chemical and Biomolecular Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 110)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Chemical Engineering, Master of Science (M.S.)

Thesis only: 30 credits

A minimum of 30 credit hours of course work in technical areas relating directly to chemical engineering is required for the M.S. degree, 6 of which are devoted to thesis research. All students seeking graduate degrees in Chemical Engineering must enroll in ENCH610, ENCH620, ENCH630, and ENCH640 if they have not completed equivalent courses. In addition to Graduate School regulations, special degree requirements (including core course GPA requirements) are described at the Chemical Engineering Department website: www.ench.umd.edu.

Course	Title	Credits
Core Requirements		
ENCH609	Graduate Seminar	2
ENCH610	Chemical Engineering Thermodynamics	3
ENCH620	Methods of Engineering Analysis	3
ENCH630	Transport Phenomena	3
ENCH640	Advanced Chemical Reaction Kinetics	3
ENCH799	Master's Thesis Research	6
Remainder of coursework		10
Total Credits		30

Chemical Engineering, Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy degree is granted only upon sufficient evidence of high attainment in scholarship and the ability to engage in independent research. The Chemical Engineering Department requires minimum of 45 semester hours of course work beyond the B.S. degree. A minimum of 18 credit hours of Thesis Research is required; students in the PhD program can register only for ENCH899. In addition to Graduate School regulations, special degree requirements include a research aptitude Ph.D. qualifying examination and a research proposal including an oral presentation covering the projected Ph.D. dissertation. All Ph.D. graduate students are required to serve as Teaching Assistants for two semesters.

Other requirements, including CORE course GPA requiremetns are found on the Department website: www.ench.umd.edu.

Course	Title	Credits
Core Requirements		
Minimum of 27 credits of courses numbered 600 or above		27
ENCH609	Graduate Seminar	
ENCH610	Chemical Engineering Thermodynamics	
ENCH620	Methods of Engineering Analysis	
ENCH630	Transport Phenomena	
ENCH640	Advanced Chemical Reaction Kinetics	
Dissertation Research Requirements		
ENCH899	Doctoral Dissertation Research	12
ENCH899	Doctoral Dissertation Research	6
or ENCH898	Pre-Candidacy Research	
Total Credits		45

Chemical Engineering (ENCH)

Graduate Degree Program
College: Engineering

Abstract

The Chemical and Biomolecular Engineering Department offers educational opportunities leading to a Doctor of Philosophy degree or Masters of Science degree in Chemical Engineering. Both degrees require a written thesis and an oral examination on the thesis. Our faculty research interests cover a wide array of subject matter and is well-equipped for graduate research in; aerosol science and engineering, biochemical engineering, computational modeling, fluid mechanics and mixing, fuel cell technology, metabolic engineering and systems biology, nanoparticle technology, polymer processing and characterization, polymer reaction engineering, process control, thermodynamics and transport phenomena, and systems research. The Department maintains a distributed computing network consisting of research laboratories and a PC laboratory. Major research facilities including electron microscopy, X-ray diffraction, X-ray photoelectron spectroscopy, and NMR are coordinated through a variety of laboratories.

Financial Assistance

Graduate research assistantships typically support qualified Ph.D. students. Graduate fellowships are available on a competitive basis to both entering and continuing Ph.D. students. Typically only those Ph.D. students who enter the program in the Fall semester are eligible for fellowships. We are unable to provide financial support to students in our masters degree program.

Contact

Graduate Coordinator
2113 Chemical and Nuclear Engineering Building
4418 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5888
Fax: 301.405.0523
Email: enchgrad@deans.umd.edu

Website: http://www.ench.umd.edu

Courses: ENCH

Admissions

The programs leading to the Master of Science and Doctor of Philosophy degrees are open to qualified students holding the Bachelor of Science degree. Admission may be granted to students with degrees in other engineering and science areas from accredited programs, and it may be necessary in some cases to require courses to establish an undergraduate Chemical Engineering background. The general regulations of the Graduate School apply in reviewing applications.

General Requirements

- Statement of Purpose
- Transcipt(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	17 Jan	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	1 Feb	28 Sep

Other Deadlines: Please visit the program website at http://www.ench.umd.edu

Requirements

- Chemical Engineering, Doctor of Philosophy (Ph.D.) (p. 111)
- Chemical Engineering, Master of Science (M.S.) (p. 111)

Facilities and Special Resources

A number of special facilities are available for graduate study and research and are coordinated through the Polymer Reaction Engineering Laboratory, the Chemical Process Systems Laboratory, the Laboratory for Mixing Studies, the Thermophysical Properties Laboratory, the Laboratory for Biochemical Engineering and the Biochemical Reactor Scale Up Facility. These laboratories contain advanced process control computers, polymer processing equipment and polymerization reactors, polymer characterization instrumentation, fermentors, a laser Doppler anemometry facility, and an aerosol characterization facility.

Chemical and Life Sciences, Master of Chemical and Life Sciences (M.Clfs.)

Non-thesis only (scholarly paper required): 30 credits

Students with a thorough and up to date understanding of biology or chemistry, and who are admitted without condition[1], may elect to take the appropriate Admission Exam. The Admission Exams are generally based on the content of CLFS510 or CLFS520. Students who feel that they can benefit from a review may take CLFS510 or CLFS520. A passing grade (B) on either the Admission Exam or CLFS510/CLFS520 is sufficient for admission to the MCLFS program as a degree-seeking student. Students may take individual courses in the MCLFS program as Advanced Students. Up to 12 credits may be taken in this way. A maximum of six credits from other institutions may be transferred in with approval of the Director. (See: Transfer Form) The program's curriculum consists of 30 credit hours selected from the list below (not including CLFS510 or CLFS520). Included in the 30 hours are 6 credits of CLFS710 or CLFS720, or the equivalent, and the completion of a scholarly paper. No more than six hours of CLFS608 credits may be counted towards the required 30 credits.

1 Students with undergraduate grade point averages below 3.0, who have not previously demonstrated superior performance in graduate courses, will be required to take CLFS510 or CLFS520. (Note: as a 500-level course this cannot be used to meet the credit requirements of the MCLFS program.)

Course	Title	Credits
Core Requirements		
CLFS710	Experimental Biology	6
CLFS608	Seminar in Current Topics in Chemical and Life Science	3
Course selection		21
Total Credits		30

Chemical and Life Sciences (CLFS)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Master of Chemical and Life Sciences is an online content-based masters program for high school science teachers that provides in-depth knowledge of current research areas in the biological, biochemical and biomedical sciences. The courses cover subject matter as diverse as genetic engineering and gene therapy to chemistry, ecology and the concepts of biocomplexity. University faculty who are experts in the field will lead discussion sessions on topics of current interest with significant social impact. Topic examples include the positive and negative aspects of genetically engineered foods and their safety, the development of new energy sources and the ethical and moral issues involved in cloning and the handling of genetic information. The program also provides a set of laboratory experiences that facilitates the presentation of many of these concepts in the classroom. Aside from the laboratory experiences, all courses will be offered exclusively through distance education as online courses. Our infrastructure provides a web-based asynchronous program. Teachers who desire to update and advance their knowledge or who must complete an advanced degree or graduate courses, will find that this program meets their needs. In addition to our general program we offer focused Areas of Concentration in Biology and in Chemistry. During the course of studies towards a degree students may earn Credentials by taking a series of focused courses.

Contact

Dr. Bretton W. Kent
MCLFS Director
3142 Plant Science
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University of Maryland
College Park, MD 20742
Telephone: 301.405.3125
Email: bkent@umd.edu

Website: http://mclfs.umd.edu/

Courses: CLFS

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (none)
- CV/Resume
- Supplementary Application
- Science undergraduate degree: The undergraduate degree must be in biological science, chemistry, biochemistry or science education
- Teaching Experience: The applicant must demonstrate one year minimum teaching experience

Admission Information for the Master of Chemical and Life Sciences can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/master-chemical-life-sciences-mclfs/apply. UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). Additional requirements can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/master-chemical-life-sciences-mclfs/apply#International

In addition to a suitable undergraduate education and experience admission to the degree program requires the successful completion of either CLFS510 or CLFS520, gateway review classes; or a passing grade of B or better on either of the admissions exams based on CLFS510 and CLFS520. Suitable GRE scores will also be accepted to satisfy admission requirements (GRE scores are not required!). Upon application and the submission of documentation all applicants will be granted Provisional Admission to the program while they satisfy other admission requirements.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	31 Jan
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	31 Jan

Other Deadlines: Please visit the program website at http://mclfs.umd.edu/

Requirements

- Chemical and Life Sciences, Master of Chemical and Life Sciences (M.Clfs.) (p. 113)

Chemical Physics, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Course	Title	Credits
Thesis or Non-Thesis Requirements		
Select one of the following:		30
Thesis:		
Select 24 credits of coursework including an advanced laboratory course		
CHPH799	Master's Thesis Research	
Non-Thesis:		
Complete 30 credits of coursework. Students must pass a written qualifying exam at the M.S. level and submit a scholarly paper.		
Total Credits		30

Admission to the program is limited to Ph.D. students. Students can earn a thesis or a non-thesis M.S. degree while working towards the Ph.D. degree. In order to earn a non-thesis M.S. degree in Chemical Physics, students must pass the written Qualifying Examination at the M.S. level, maintain a B average, scholarly paper, 30 graduate credits of which 24 must be course credits including:

1. Advanced laboratory course
2. Two credits of seminar, can be included in the non-course credits
3. Advanced course at the 600 level or above.

The Examining Committee consists of at least two faculty members, who will read the scholarly paper and attend the oral presentation. The paper should provide an informative review of the research topic selected by the candidate in consultation with his/her academic and research advisors. The bibliography is a particularly important part of the paper and should include the most significant references to the topic. The length of the paper is expected to be approximately 20 double space pages (12-point font) with 1-inch margins. The presentation is to last approximately one hour and can be part of regularly scheduled seminar series such as the Informal Statistical Mechanics Seminar or the Nonlinear Dynamics Seminar. Two faculty must be present and there should be sufficient time for questions and discussion.

For the thesis M.S. degree, students must complete a written masters thesis, maintain a B average, a scholarly paper and complete 30 graduate credits including:

1. Six credits of CHPH799
2. 24 course credits
3. Two credits of seminar, can be included in the non-course credits
4. Advanced laboratory course
5. Advanced course at the 600 level or above.

The Thesis Examining Committee is to consist of at least three faculty members including the research advisor. The Examination Committee will review the M.S. thesis, attend the oral presentation and participate in the defense of the thesis. The thesis is to consist of an introduction to the field of research with which the student is engaged, a clear statement of the problem under study, the objectives of the research, the approach taken, original results, interpretation, discussion, and conclusions. A concise review of the literature, and a bibliography of the most important literature should also be included. The M.S. thesis has no set length, but is typically 30 to 40 pages. The format of the thesis (font, margins, etc.) must follow the University of Maryland Thesis and Dissertation Style Guide.

Chemical Physics, Doctor of Philosophy (Ph.D.)

Course	Title	Credits
Core Requirements		
24 credits of coursework including:		24
PHYS622	Introduction to Quantum Mechanics I	
PHYS623	Introduction to Quantum Mechanics II	
CHEM691	Quantum Chemistry II	
Advanced laboratory course		
Advanced course		
Seminar courses		
Two Laboratory Rotations		
Dissertation Research Requirements		
CHPH899	Doctoral Dissertation Research	12
Total Credits		36

Students must pass the written Qualifying Examination passed at the Ph.D. level, normally taken at the beginning of the second year. Maintain a B average, present a scholarly paper research presentation, 24 graduate course credits including:

1. Two credits of seminar
2. Advanced laboratory course
3. Advanced course outside of the student's main field of study at the 600 level or above

In order to advance to Ph.D. candidacy, the student must submit a scholarly paper and make an oral presentation. The paper and presentation are evaluated by a candidacy committee consisting of at least two faculty members, generally including the advisor and a member

of the advisory committee. Students with a well-developed thesis topic and research results are expected to include these results together with further research plans in their paper and presentation. Students less far along with research will present background material and summaries of the research areas in which they will be working. A concise review of the literature is expected, along with a bibliography of the most important literature. The length of the paper is expected to be between approximately 20 double space pages (12-point font) with 1-inch margins. The paper is to be submitted to the candidacy committee at least two weeks before the date of the oral presentation. The presentation is to last approximately 50 minutes and can be part of regularly scheduled seminar series such as the Informal Statistical Mechanics Seminar or the Nonlinear Dynamics Seminar. Two members of the candidacy committee must be present and there should be sufficient time for questions and discussion. Within 12 to 18 months after beginning Ph.D. research, the student is to select a Ph.D. Thesis Examination Committee. 12 credits of CHPH899 (Ph.D. dissertation research, only available after advancement to Ph.D. candidacy) Written Ph.D. dissertation. The format of the dissertation (font, margins, etc.) must follow the University of Maryland Thesis and Dissertation Style Guide.

Chemical Physics (CHPH)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Chemical Physics Program is a program of study and research leading to Master of Science and Doctor of Philosophy degrees for students who wish to enter professional careers requiring an in-depth knowledge of both physics and chemistry. Students can choose research topics across many disciplines including biophysics, chemistry, physics, chemical engineering, electrical engineering, materials and nuclear engineering, mechanical engineering, and meteorology.

The Chemical Physics Program is designed for students with undergraduate degrees in physics, chemistry, or engineering who are sufficiently well prepared in mathematics and the physical sciences to undertake graduate training in physics and physical chemistry. Formal course offerings in quantum mechanics, quantum chemistry, spectroscopy, thermodynamics, electricity and magnetism, statistical mechanics and biophysics prepare a student to explore the broad range of research topics at the University of Maryland. Research areas of the Chemical Physics faculty include: the study of single molecules as well as gases, surfaces, solids and polymers by means of laser-light, electron scattering, and nanomicroscopies; the study of dynamic phenomena from atom-molecule collisions to protein-folding and hydrodynamics; thermodynamics from phase transitions and critical phenomena to combustion; the statistical mechanical theory of phase transitions, fluid dynamics and non-equilibrium phenomena; the quantum mechanical theory of molecules and molecular dynamics; atmospheric physics and chemistry; and biophysics.

The Chemical Physics Program is sponsored by the Institute for Physical Science and Technology and seven academic departments: Chemistry and Biochemistry, Physics, Electrical and Computer Engineering, Chemical Engineering, Materials and Nuclear Engineering, Mechanical Engineering, and Meteorology. Formal arrangements with the National Institute of Standards and Technology (NIST) and the National Institute of Health (NIH) allow students to perform research off campus under the supervision of a government scientist associated with the program and a Chemical Physics faculty member. The Chemical Physics Committee oversees the program and is made up of representatives from the sponsoring units with the Program Director as chair. The Chemical Physics Program Office administers the program and is affiliated with the Institute for Physical Science and Technology. A booklet describing Chemical Physics at Maryland, College Park, can be obtained from the Chemical Physics office upon request.

Financial Assistance

Teaching and research assistantships are available for qualified students. There are also University and Chemical Physics Fellowships available.

Contact

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Professor and Director of Graduate Studies
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College Park, MD 20742
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Email: gpapoian@umd.edu

Website: http://www.chemicalphysics.umd.edu

Courses: CHPH

Admissions

The program is for students with undergraduate degrees in chemistry, physics or engineering. For those students with degrees in other disciplines, knowledge of calculus, differential equations, and vector algebra, as well as introductory mechanics, electricity and magnetism, and quantum mechanics is ordinarily expected.

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- GRE Subject
- Description of Research/Work Experience

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	3 Jan
International Applicants	

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	3 Jan

Other Deadlines: Please visit the program website at http://www.chemicalphysics.umd.edu

Requirements

- Chemical Physics, Doctor of Philosophy (Ph.D.) (p. 114)
- Chemical Physics, Master of Science (M.S.) (p. 114)

Facilities and Special Resources

Incoming students are provided with private desk space and up to date computer facilities. There is a wide array of advanced equipment associated with the various research groups in the Program including scanning probe microscopes, high-resolution spectrographs, ultra-short high-power lasers, multi-coincidence electron scattering spectrometers, and a fully equipped light-scattering laboratory.

Chemistry, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

Thesis Option

At least 12 of the 24 credits of coursework must be in Chemistry or Biochemistry numbered 600 or higher. In addition, students are required to complete six credits of CHEM799. The thesis option requires a seminar presentation and an oral defense of the thesis.

Non-Thesis Option

At least 18 of the 24 credits of coursework must be in Chemistry or Biochemistry, of which at least 14 credits must be at or above the 600 level. In addition, students are required to complete six credits of CHEM699 and submit a scholarly paper. The scholarly paper is reviewed by a committee of 3 faculty members. Copies of specific regulations are available from the Department of Chemistry and Biochemistry or on the internet at: www.chem.umd.edu.

Course	Title	Credits
Required courses:		24
CHEM611	Professional Skills for New Graduate Students	
CHEM612	Scientific Presentations	
Thesis or Non-Thesis Requirements		6
Thesis		
CHEM799	Master's Thesis Research	
Non-Thesis		
CHEM699	Special Problems in Chemistry	
Scholarly Paper		
Total Credits		30

Chemistry, Doctor of Philosophy (Ph.D.)

At least 12 of the 21 credits of coursework must be in Chemistry or Biochemistry courses numbered 600 or higher. Students must successfully pass an oral exam for advancement to candidacy, and a dissertation defense in order to earn the doctoral degree.

Course	Title	Credits
Coursework requirements include:		21
CHEM611	Professional Skills for New Graduate Students	
CHEM612	Scientific Presentations	
CHEM889	Seminar [1]	
Dissertation Research Requirements		
CHEM899	Doctoral Dissertation Research	12
Total Credits		33

[1] One credit of CHEM889 can be counted towards the 21 credit requirement but only if that one credit is earned during the semester that the student presents a formal seminar.

Chemistry (CHEM)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Department of Chemistry and Biochemistry offers graduate study leading to the Ph.D. degree in Chemistry. Our Ph.D. program in Chemistry has a strong core in the traditional fields of chemistry, including analytical chemistry, chemical physics (in cooperation with the Institute of Physical Sciences & Technology), environmental chemistry, inorganic chemistry, nuclear chemistry, organic chemistry and physical chemistry. In addition to these traditional areas we also have interdisciplinary programs in contemporary areas such as nanoscience, chemical biology, energy sciences, materials chemistry, theoretical chemistry, and supramolecular chemistry.

Financial Assistance

Ph.D. candidates are normally supported on graduate teaching assistantships during their first year in graduate school as long as they are in good standing. Teaching assistants usually instruct undergraduate laboratory and recitation classes and receive in return a tuition waiver of ten credits each semester, a salary and health care benefits. In subsequent years, Ph.D. candidates are typically supported on graduate research assistantships or fellowships. Financial assistance is not typically available to M.S. candidates.

Contact

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Program Management Specialist
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Website: http://www.chem.umd.edu

Courses: BCHM CHEM

Relationships: Biochemistry (BCHM) (p. 72), Chemical Physics (CHPH) (p. 115)

Admissions

Admission to graduate study at the University of Maryland requires a minimum of a Bachelor of Science (B.S.), Bachelor of Arts (B.A.) or equivalent degree. Previous coursework must normally include a minimum of 30 semester or 40 quarter hours of chemistry, with at least 1 year of physical chemistry, 1 year of organic chemistry and 1 semester of inorganic chemistry, as well as laboratory courses in organic chemistry and physical chemistry. A laboratory course in analytical chemistry is also preferred. The following application materials are required:

1. Graduate application;
2. personal statement;
3. general Graduate Record Examination (GRE) scores;
4. grade transcripts;
5. 3 letters of reference.

The chemistry subject GRE score is not required but it can be helpful for a complete evaluation. Applicants from non-English speaking countries must also present the results of the Test of English as a Foreign Language (TOEFL) and the Test of Spoken English (TSE).

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Description of Research/Work Experience
- GRE Subject (optional/highly recommended)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	17 Jan

Other Deadlines: Please visit the program website at http://www.chem.umd.edu

Requirements

- Chemistry, Doctor of Philosophy (Ph.D.) (p. 116)
- Chemistry, Master of Science (M.S.) (p. 116)

Facilities and Special Resources

The Department has state-of-the-art research facilities to support research in the fields listed above. Facilities include "clean" rooms for environmental sample analysis, X-ray crystallographic instrumentation, numerous mass spectrometers, numerous NMR spectrometers including 400, 500, 600 and 800 MHz Fourier-transform NMR spectrometers; an XPS spectrometer, Atomic Force Microscopes, ultracentrifuges, analytical optical spectrometers, and a state-of-the-art computer graphics facility.

Departmental research is supported by a departmental server and many individual faculty workstations. The Department has access to electronics shop and campus machine shops. The Chemistry Library has an extensive collection in chemistry, biochemistry, and other fields. Electronic access to journals and literature search databases is available. A Macintosh workstation facility (25 units) is available in the Department for student/faculty use.

Civil and Environmental Engineering, Master of Science (M.S.)

Students are required to complete 30 credits within one of the seven specializations. The M.S. degree program offers a thesis option and very rarely a non-thesis option. Applicants who do not wish to complete a thesis are encouraged to consider the Professional Master of Engineering (ENPM) degree instead: http://www.gradschool.umd.edu/catalog/programs/enpm.htm

Course	Title	Credits
Specialization Requirements (select one)		30
1. Environmental		
ENCE650	Process Dynamics in Environmental Systems	
ENCE651	Chemistry of Natural Waters	
ENCE652	Microbiological Principles of Environmental Engineering	
2. Civil Systems		
ENSE621	Systems Concepts, Issues, and Processes	
or ENSE622	Systems Requirements, Design and Trade-Off Analysis	
ENCE603	Management Science Applications in Engineering	
or ENCE677	OR Models for Transportation Systems Analysis	
ENCE688	Advanced Topics in Civil Engineering (ENCE688A Sensing and Systems Control)	
3. Geotechnical		
All courses approved by advisor		
4. Project Management		
ENCE661	Project Cost Accounting and Finance	
ENCE662	Introduction to Project Management	
ENCE664	Legal Aspects of Engineering Design and Construction	
ENCE665	Management of Project Teams	
ENCE627	Project Risk Management	
5. Structures		
All courses approved by advisor		
6. Transportation		
All courses approved by advisor		
7. Water Resources		
ENCE431	Hydrologic Engineering	

ENCE630	Environmental and Water Resource Systems I	
Total Credits		30

THESIS OPTION:

- At least 24 credits of coursework are required beyond the B.S. degree, including a minimum of 18 credits at the 600 level or above.
- In addition, six credits of ENCE799 are required.

NON-THESIS OPTION:

- At least 30 credits of coursework are required beyond the B.S. degree, including a minimum of 24 credits at the 600 level or above.
- In addition, students are required to complete a scholarly paper

Civil and Environmental Engineering, Doctor of Philosophy (Ph.D.)

The requirements for the Ph.D. degree are also the same as those of the Graduate School. The student will work closely with an adviser to develop an approved program of study suited to his or her individual needs. Before admission to candidacy, the student must pass a qualifying examination, which is normally taken after the coursework is at least 75 percent completed. There is no language requirement for the Ph.D.

Doctoral students are required to complete 36 credits beyond the Bachelor's degree, which would include the credits earned in the completion of a Master's degree. A qualifying examination is required in order to advance to candidacy. A doctoral student who passes the qualifying exam is admitted to candidacy will automatically be registered for 6 credits of ENCE899. A minimum of 12 credits must be taken in ENCE899.

Course	Title	Credits
Specialization Requirements (select one)		30
1. Environmental		
ENCE650	Process Dynamics in Environmental Systems	
ENCE651	Chemistry of Natural Waters	
ENCE652	Microbiological Principles of Environmental Engineering	
2. Civil Systems		
ENSE621	Systems Concepts, Issues, and Processes	
or ENSE622	Systems Requirements, Design and Trade-Off Analysis	
ENCE603	Management Science Applications in Engineering	
or ENCE677	OR Models for Transportation Systems Analysis	
ENCE688	Advanced Topics in Civil Engineering (ENCE688A Sensing and Systems Control)	
3. Geotechnical		
All courses approved by advisor		
4. Project Management		
ENCE661	Project Cost Accounting and Finance	
ENCE662	Introduction to Project Management	
ENCE664	Legal Aspects of Engineering Design and Construction	
ENCE665	Management of Project Teams	
ENCE627	Project Risk Management	
5. Structures		
All courses approved by advisor		
6. Transportation		
All courses approved by advisor		
7. Water Resources		
ENCE431	Hydrologic Engineering	
ENCE630	Environmental and Water Resource Systems I	
Dissertation Research Requirements		12
ENCE899	Doctoral Dissertation Research	
Total Credits		42

Civil and Environmental Engineering (ENCE)

Graduate Degree Program
College: Engineering

Abstract

The Department of Civil and Environmental Engineering offers graduate courses leading to the Master of Science and Doctor of Philosophy degrees. All programs are planned on an individual basis by the student and an adviser taking into consideration the student's background and special interests. Areas of concentration at both the master's and doctoral levels include: transportation engineering, environmental engineering, water resources engineering, structural engineering, geotechnical engineering, civil systems, and project management.

Financial Assistance

Research assistantships may be available from individual faculty members, depending on available resources. Only a limited number of teaching assistantships are available. Part-time work as grading assistants may be available as well.

Contact

Department of Civil and Environmental Engineering
1173 Glenn L. Martin Hall
4298 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4195
Fax: 301.405.2585
Email: ence-admissions@umd.edu

Website: http://www.civil.umd.edu

Courses: ENCE ENCE

Admissions

Applicants for admission should hold a B.S. degree in civil engineering. However, applicants with undergraduate degrees in other disciplines may be accepted with the stipulation that deficiencies in prerequisite undergraduate coursework be corrected before enrolling in graduate courses. In addition to the requirements set forth by the Graduate School, applicants must have a minimum GPA of 3.0 to apply to the Master's Program, and a minimum GPA of 3.5 to apply to the Doctoral Program. Applicants with lower GPA's may be considered and accepted in a provisional basis if other indicators of ability are exceptional (letters of recommendation, GRE scores, prior experience ...). Applicants are also

required to submit results from the Graduate Record Examination. There are no entrance examinations required for the program.

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority Consideration: 17 Jan / Final: 1 May	Priority Consideration: 1 Sept / Final: 2 Oct
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority Consideration: 17 Jan / Final: 15 Jan	Priority Consideration: 1 Sept / Final: 18 Sept

Other Deadlines: Please visit the program website at http://www.civil.umd.edu

Requirements

- Civil and Environmental Engineering, Doctor of Philosophy (Ph.D.) (p. 118)
- Civil and Environmental Engineering, Master of Science (M.S.) (p. 117)

Facilities and Special Resources

Departmental research facilities include laboratories in the following areas: transportation, systems analysis, environmental engineering, hydraulics, remote sensing, structures, and soil mechanics. Graduate students have convenient access to a spectrum of computer facilities, including networked personal computers and workstations, specialized computer-aided design, graphics, and visualization laboratories, campus mainframe computers, and remote supercomputer facilities.

The Washington and Baltimore metropolitan areas are easily accessible for data, field studies, library access, contacts with national organizations, and attendance at national meetings. The location of the University of Maryland offers a unique opportunity to obtain an advanced degree in civil engineering.

Civil and Environmental Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

All students must complete 30 credits of coursework within one of the following specializations. Courses listed under each option are pre-approved. Any other course a student wishes to take must be approved by an advisor.

Geotechnical and pavements

Course	Title	Credits
Students can select from the following courses. All other courses must be approved by an advisor:		30
ENCE441	Foundation Design	
ENCE447	Pavement Engineering	
ENCE640	Advanced Soil Mechanics	
ENCE641	Advanced Foundations Systems	
ENCE643		
ENCE644	Advanced Pavement and Civil Engineering Materials	
ENCE645	Geotechnics of Waste Disposal	
ENCE647	Slope Stability and Seepage	
ENCE740	Computational Geomechanics	
ENCE741	Earth Retaining Structures	
ENCE743	Soil Dynamics and Earthquake Engineering	
ENCE744	QA/QC and Specification for Highway Materials	
ENCE747		

Structures

Course	Title	Credits
Students can select from the following courses. All other courses must be approved by an advisor:		30
ENCE610	Fundamentals of Structural Analysis	
ENCE611	Finite Element Methods	
ENCE613	Structural Dynamics	
ENCE710	Steel Structures I	
ENCE711		
ENCE713	Concrete Structures I	
ENCE714		
ENCE715	Earthquake Engineering	
ENCE716		
ENCE717	Bridge Structures	
ENCE718	Advanced Structural Systems	

transportation

Course	Title	Credits
Students can select from the following courses. All other courses must be approved by an advisor:		30
ENCE670	Highway Traffic Characteristics and Measurements	
ENCE672	Regional Transportation Planning	
ENCE673	Urban Transportation	

ENCE674	Urban Transit Planning and Rail Transportation Engineering
ENCE675	Airport Planning and Design
ENCE676	Highway Traffic Flow Theory
ENCE677	OR Models for Transportation Systems Analysis
ENCE681	Freight Transportation Analysis

project management

Course	Title	Credits
Core courses		15
ENCE661	Project Cost Accounting and Finance	
ENCE662	Introduction to Project Management	
ENCE664	Legal Aspects of Engineering Design and Construction	
ENCE665	Management of Project Teams	
ENCE627	Project Risk Management	
Electives chosen with advisor		15

Environmental and water resources

Course	Title	Credits
Students can select from the following courses. All other courses must be approved by an advisor.		30
ENCE630	Environmental and Water Resource Systems I	
ENCE631	Hydrologic Analysis and Nonpoint Pollution Models	
ENCE635	Geographic Information Systems for Watershed Analysis	
ENCE652	Microbiological Principles of Environmental Engineering	
ENCE650	Process Dynamics in Environmental Systems	
ENCE651	Chemistry of Natural Waters	
ENCE655	Environmental Behavior of Organic Pollutants	
ENCE730	Environmental and Water Resource Systems II	
ENCE752		
ENCE753		
ENCE755	Transformations of Organic Compounds in the Environment	
ENCE756		

Civil and Environmental Engineering (PMCE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our degree programs in civil and environmental engineering provide advanced expertise in structures, pavements, environmental engineering, and water resources.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. Tuition and fees are subject to change.

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/civil-environmental.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Civil and Environmental Engineering, Master of Engineering (M.Eng.) (p. 119)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Civil and Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Students must complete 12 credits in one of the certificate track options.

Environmental and Water Resources

Course	Title	Credits
ENCE630	Environmental and Water Resource Systems I	3
Select three additional approved courses		9
ENCE756		
ENCE688	Advanced Topics in Civil Engineering (ENCE688C)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688O)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688B)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688T)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688Y)	
Total Credits		12

Geotechnical

Course	Title	Credits
ENCE640	Advanced Soil Mechanics	3
ENCE643		3
ENCE741	Earth Retaining Structures	3
Select one additional approved course		3
ENCE641	Advanced Foundations Systems	
ENCE688	Advanced Topics in Civil Engineering (ENCE688P)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688T)	
ENCE743	Soil Dynamics and Earthquake Engineering	
Total Credits		12

Structural

Course	Title	Credits
ENCE611	Finite Element Methods	3
ENCE710	Steel Structures I	3
ENCE713	Concrete Structures I	3
Select one additional approved course		3
ENCE610	Fundamentals of Structural Analysis	
ENCE613	Structural Dynamics	
Total Credits		12

Transportation

Course	Title	Credits
Select four of the following:		12
ENCE674	Urban Transit Planning and Rail Transportation Engineering	
ENCE675	Airport Planning and Design	
ENCE677	OR Models for Transportation Systems Analysis	
ENCE681	Freight Transportation Analysis	
ENCE688	Advanced Topics in Civil Engineering	
Total Credits		12

Civil and Environmental Engineering (Z056)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our degree programs in civil and environmental engineering provide advanced expertise in structures, pavements, environmental engineering, and water resources

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate

FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/civil-environmental.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) and Permanent Residents; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Civil and Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 121)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Classics, Master of Arts (M.A.)

Students choose either the Latin or Latin and Greek track. All students must pass a proficiency exam, submit a Scholarly Article Analysis, commentary, and present at the Classics department research conference.

Latin track: 30 credits required

Course	Title	Credits
Core Requirements		
LATN472	Historical Development of the Latin Language	3
or LATN672	Historical Development of the Latin Language	
Two courses may be in CLAS, HIST, or an allied field		6
Two of the remaining courses may be in LATN4xx, the others must be LATN6xx		21
Total Credits		30

Latin and Greek track: 33 credits required

Course	Title	Credits
Core Requirements		
LATN472	Historical Development of the Latin Language	3
or LATN672	Historical Development of the Latin Language	
GREK472	History and Development of the Greek Language	3
or GREK672	History and Development of the Greek Language	
One course may be in CLAS, HIST, or an allied field		3
One of the remaining courses may be in LATN4xx; two of the remaining courses may be in GREK4xx; the others must be LATN6xx or GREK6xx		24
Total Credits		33

Classics (CLAS)

Graduate Degree Program

College: Arts and Humanities

Abstract

The Department of Classics offers a graduate program of study with specializations in Latin or Latin and Greek, leading to the Master of Arts degree. The program provides students with advanced study of the Latin and/or Greek languages and literatures in the context of a broader and deeper knowledge and understanding of Greek and Roman culture and civilization. In addition to advanced courses in language, each student will be required to take coursework in related disciplines outside of the Classics Department. Some individual programs may require more than 30 hours. Students may choose one of two tracks toward the degree: Latin or Latin and Greek.

Financial Assistance

Teaching assistantships and several categories of fellowships are available for outstanding applicants. Contact the graduate director or the department chair for details.

Contact

Eric Adler
Associate Professor and Director of Graduate Studies
Department of Classics
1210 Marie Mount Hall
7814 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2019
Fax: 301.314.9084
Email: eadler@umd.edu

Website: http://www.classics.umd.edu

Courses: CLAS GREK LATN

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample
- Second Writing Sample (optional)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationclas.pdf)
- Publications/Presentations

In addition to the general requirements for admission established by the Graduate School (see "General Information" section in this catalog), applicants must demonstrate a proficiency in translating the ancient language(s) at the advanced undergraduate level.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred 25 Jan / Final: 26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas immigrants	1 Feb	N/A

Other Deadlines: Please visit the program website at http://www.classics.umd.edu

Requirements

- Classics, Master of Arts (M.A.) (p. 122)

Facilities and Special Resources

The Baltimore-Washington, D.C., area boasts of several outstanding classical libraries. Located in Washington, D.C., are the Center for Hellenic Studies, the Byzantine Library of Dumbarton Oaks, and the Library of Congress. Students may also use the Eisenhower Library on the campus of the Johns Hopkins University in Baltimore.

Clinical Audiology, Doctor of Audiology (Au.D.)

Doctoral students are required to complete 93 credits including 61 credits of coursework and 32 credits of Clinical Registration requirements.

The Au.D. program requires 57 credit hours of graduate coursework, 4 credit hours for a doctoral capstone research project, 14 credit hours of clinical practicum registration, and 18 credit hours of full-time clinical internship registration, for a total of 93 credit hours. The Au.D. curriculum meets requirements specified in the Standards for the Certificate of Clinical Competence in Audiology of the American Speech-Language-Hearing Association, as well as those required for Board Certification in Audiology from the American Board of Audiology. Au.D. students must pass comprehensive examinations and complete a capstone research project. Full-time students are expected to complete the program in four years.

Course	Title	Credits
Core Requirements		
HESP600	Instrumentation in Hearing and Speech Sciences	3
HESP634	Anatomy and Physiology of the Auditory and Vestibular Systems	3
HESP722	Psychoacoutics	3
HESP724	Research Design	3
HESP606	Basic Hearing Measurements	3
HESP630	Electrophysiological Measurements	3
HESP632	Medical Audiology	3
HESP635	Aural Rehabilitation/Habilitation	3
HESP636	Geriatric Audiology	3

HESP645	Pediatric Audiology	3
HESP704	(Audiology Practice Management)	3
HESP700	Hearing Aids	3
HESP701	Hearing Aids II	3
HESP706	Advanced Clinical Audiology	3
HESP710	Industrial and Environmental Noise Problems	3
HESP730	Vestibular-ocular Assessment and Management (Electrophysiologic Measures II)	3
HESP712	Cochlear Implants and Other Implantable Technologies	3
HESP615	Counseling in Communicative Disorders	3
EDMS645	Quantitative Research Methods I	3
or PSYC601	Quantitative Methods I	
HESP849	Capstone Research Project I	2
HESP859	Capstone Research Project II	2
Clinical Registration Requirements:		
HESP649	Clinical Practice in Audiology (HESP649A - Diagnostic Procedures)	8
HESP649	Clinical Practice in Audiology (HESP649B - Aural Rehabilitation)	2
HESP729	Advanced Clinical Practice in Audiology	4
HESP829	Clinical Internship Residency	18
Total Credits		93

Clinical Audiology, Combined Doctor of Audiology and Doctor of Philosophy (Au.D./Ph.D.)

Doctoral students are required to complete 110 credits including 78 credits of coursework and 32 credits of Clinical Registration Requirements. Students must also successfully pass the comprehensive exams.

The Dual-degree (Au.D./Ph.D.) program requires 60 credit hours of graduate coursework, 6 credit hours of pre-candidacy research, 12 credit hours of dissertation research, 14 credit hours of clinical practicum registration, and 18 credit hours of full-time clinical internship registration, for a total of 110 credit hours. The Dual-degree program is designed to meet requirements specified in the Standards for the Certificate of Clinical Competence in Audiology of the American Speech-Language-Hearing Association and in the Handbook for Board Certification in Audiology of the American Board of Audiology. The program also meets all requirements of the Graduate School. Ph.D. students must develop an individual study plan with the approval of a faculty Program Planning Committee, pass comprehensive examinations, and complete a dissertation and oral defense. Full-time students are expected to complete the program in approximately 6 years. Students will earn an Au.D. degree on the way to the Ph.D. degree after they have successfully completed academic coursework, pre-candidacy research, clinical practicum, the 4th-year clinical externship, and comprehensive examinations. The Department of Hearing and Speech Sciences also offers the traditional Doctor of Philosophy degree, with major emphasis in either speech, language or hearing, for those students seeking careers in research or higher education without clinical training. For information about the Ph.D. in Hearing and Speech Sciences (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?HESP), please see HESP (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?HESP).

Course	Title	Credits
Core Requirements		
HESP600	Instrumentation in Hearing and Speech Sciences	3
HESP634	Anatomy and Physiology of the Auditory and Vestibular Systems	3
HESP722	Psychoacoutics	3
HESP724	Research Design	3
HESP606	Basic Hearing Measurements	3
HESP630	Electrophysiological Measurements	3
HESP632	Medical Audiology	3
HESP635	Aural Rehabilitation/Habilitation	3
HESP636	Geriatric Audiology	3
HESP645	Pediatric Audiology	3
HESP700	Hearing Aids	3
HESP701	Hearing Aids II	3
HESP706	Advanced Clinical Audiology	3
HESP730	Vestibular-ocular Assessment and Management (Electrophysiologic Measures II)	3
BIOL600	Ethics in Scientific Research	2
Select one of the following:		6
EDMS645 & EDMS646	Quantitative Research Methods I and General Linear Models I	
PSYC601 & PSYC602	Quantitative Methods I and Quantitative Methods II	
Electives		10
HESP898	Pre-Candidacy Research	6
Clinical Registration Requirements:		
HESP649	Clinical Practice in Audiology (HESP649A - Diagnostic Procedures)	8
HESP649	Clinical Practice in Audiology (HESP649B - Aural Rehabilitation)	2
HESP729	Advanced Clinical Practice in Audiology	4
HESP829	Clinical Internship Residency	18
Dissertation Research Requirements		
HESP899	Doctoral Dissertation Research	12
Total Credits		110

Clinical Audiology (CAUD)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

Advanced graduate study in clinical audiology available through the Department of Hearing and Speech Sciences within the College of Behavioral and Social Sciences, consists of the Doctor of Audiology program (CAUD) in which students earn the Au.D. degree. This doctoral program is available to post-baccalaureate students who have completed undergraduate pre-requisites in hearing and speech sciences/communication sciences and disorders. The CAUD program is an academically based, clinically oriented program designed primarily to prepare professional Audiologists. While information pertaining to hearing disorders comprises the central focus of the degree, education

about the normal processes of communication, as well as about research design, is considered an integral part of the program. Students completing the program are eligible to obtain the Certificate of Clinical Competence in Audiology (CCC-A) of the American-Speech-Language-Hearing Association, Board Certification in Audiology by the American Board of Audiology (ABA), and licensure in the State of Maryland and other states. A Ph.D. in Audiology is also available to those students who have already completed a graduate degree in Audiology (i.e., Au.D. degree or M.A. degree). A dual-degree program is available to CAUD students, in which they earn the Au.D. degree and continue their study immediately for the Ph.D. degree. Those students in the program who wish to pursue the dual-degree program will earn the Au.D. at the point in doctoral training when they have completed all of the academic, clinical, and research requirements for this first professional degree.

(Note: Applicants for the M.A. program in Speech-Language Pathology, please see SPLA; Applications for the Hearing and Speech Sciences Ph.D., please see HESP).

Additional information about the program's highlights can be found at the link below.
https://hesp.umd.edu/content/program-highlights-doctoral-program-clinical-audiology

Financial Assistance

A limited number of graduate assistantships are available through the Department. Assistantships that carry teaching, research or clinical responsibilities are awarded on a competitive basis. Students may also seek assistantships from other units on campus or scholarships sponsored by Federal agencies (e.g., NIDCD) or private foundations (e.g., American Speech-Language-Hearing Foundation; American Academy of Audiology Foundation).

Additional resources for funding opportunities can be found at the link below:
http://hesp.umd.edu/undergraduate/apply-funding

Contact

Sandra Gordon-Salant, Ph.D
Director of Doctoral Program in Clinical Audiology
Department of Hearing and Speech Sciences
0100 Samuel J. Lefrak Hall
7251 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4225
Fax: 301.314.2023
Email: hespadmissions@umd.edu

Website: http://www.hesp.umd.edu

Courses: EDMS HESP

Relationships: Neurosciences and Cognitive Science (NACS) (p. 316)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://hesp.umd.edu/content/program-highlights-doctoral-program-clinical-audiology))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umdsupplementaryapplicationcaudsplahespcert.pdf)
- Prerequisites: Completion of at least 60% of undergraduate prerequisite courses prior to application. For a list of pre-requisite courses, please go here (https://hesp.umd.edu/content/application-faqs).

Admissions to the graduate program in Clinical Audiology is on a very competitive basis. Students admitted to the Au.D. program in Audiology generally have a minimum grade point average of 3.4 from a baccalaureate program in hearing and speech sciences, or related discipline. All applicants to the CAUD graduate program are required to furnish GRE scores taken within the last five years, three letters of recommendation, official transcripts from all undergraduate and graduate studies, and a statement of purpose. Admission to the program is confined to fall matriculation, Prospective applicants should note that decisions on admissions are made in early March. Students must submit application materials for the fall semester by January 5. Applicants with a background in the hearing and speech sciences or a related field are considered for admission to the Au.D., which requires four years of graduate study. We no longer accept students who have not fulfilled their undergraduate requirements. Students interested in the dual degree track (Au.D./Ph.D.) are admitted into the CAUD program and request a switch to the dual degree program after completion of the 3rd year of study. The time required for completion of the dual degree track is 6-7 years of full-time graduate study. For more information on the prerequisite course requirements, please see our website: hesp.umd.edu.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.hesp.umd.edu

Requirements

- Clinical Audiology, Doctor of Audiology (Au.D.) (p. 123)
- Clinical Audiology, Combined Doctor of Audiology and Doctor of Philosophy (Au.D./Ph.D.) (p. 124)

Facilities and Special Resources

The Department's facilities include numerous modern research laboratories equipped to support research in the areas of: acoustic phonetics, psychoacoustics, cochlear implants, hearing aids, infant and adult speech perception, neuropsychology, language, voice, fluency and electrophysiology. There are multiple sound-attenuating chambers and one electrically-shielded chamber devoted to research with humans, which are all integrated with computers and peripheral equipment for acoustic signal development, signal analysis, presentation and on-line data collection. The Department also houses the Hearing and Speech Clinic at UMCP. this clinic serves as the initial practicum site for all students pursuing clinical training. The Clinic includes multiple audiological test suites equipped for diagnostic testing, a complete hearing aid dispensary, a group rehabilitation room, and state-of-the-art equipment for behavioral and electrophysiological diagnostic testing, as well as hearing aid selection and fitting and cochlear implant programming. Ten speech and language diagnostic and therapy rooms are integrated with observation areas; and an on-site language pre-school (LEAP, the Language-Learning Early Advantage Program), also equipped for observation. Students pursuing clinical training in Audiology will also have access to the Audiology Service, Division of Audiology-Head and Neck Surgery, of the University of Maryland and University Hospital in Baltimore (UMB), for part-time clinical rotations or full-time clinical externships. This Service provides a full range of auditory and vestibular diagnostic and rehabilitative services in a large metropolitan hospital setting. Students also engage in clinical activities in the Audiology Section of the Clinical Center as well as intramural research programs of the National Institute on Deafness and Other Communication Disorders of the National Institutes of Health. All of the clinical and research facilities are potentially available for the conduct of student-directed research projects, or for student participation in faculty-initiated research projects. Additional research and clinical opportunities are available at Walter Reed National Military Medical Center, the Johns Hopkins University School of Medicine, and at other facilities in the Washington and Baltimore metropolitan areas. The Library of Congress, the National Library of Medicine and the libraries of various medical schools in the Washington-Baltimore area supplement the University's extensive libraries at College Park. The Department of Hearing and Speech Sciences participates in the Center for the Comparative and Evolutionary Biology of Hearing Training Program (C-CEBH), the Neuroscience and Cognitive Sciences graduate program (see NACS), the Maryland Language Science Center, the Cochlear Implant Center on Excellence (MCICE), and has ties to the Center for the Advanced Study of Language (CASL); these connections afford students the opportunity to work with faculty in other departments at the University of Maryland, College Park, or at UMB.

Clinical Psychological Science, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
PSYC622	Research Methods in Clinical Psychology	3
PSYC623	Child Psychopathology	3
PSYC624	Adult Psychopathology	3
PSYC625	Clinical Assessment: Psychometric Principles, Testing and Behavior	3
PSYC630	Behavioral and Cognitive Behavioral Intervention for Adults	3
PSYC632	Behavioral and Cognitive Behavioral Intervention for Children and Adolescents	3
PSYC643	Ethical and Professional Issues in Clinical Psychology	3
PSYC644	Basic Foundation of Clinical Interventions	3
PSYC650	Culture and Diversity in Mental Health	3
PSYC651	Writing and Critical Thinking	3
Total Credits		30

Clinical Psychological Science (MPPS)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The University of Maryland is proud to offer a Master of Professional Studies (MPS) in Clinical Psychological Science, the only master's-level degree that focuses explicitly on clinical psychological science. The goal of the MPS program is to provide rigorous training in clinical psychology, including coursework in evidence-based psychological assessment and interventions, as well as state-of-the-art research methods and critical thinking skills. Students take 10 courses (two per term) over the course of 15 months. Courses are taught in the evenings at the College Park campus and are designed for working professionals who desire advanced knowledge in clinical science to enter, advance, or expand their career options in the mental health field.

CONTACT

Andrea Chisolm, Ph.D.
Director of Graduate Studies
Department of Psychology
1147 Biology-Psychology Building
4094 Campus Drive
University of Maryland
College Park, MD 20740
Telephone: 301.405.7190
Email: chisolm@umd.edu

Website: http://ter.ps/oesclinpsyc

Admissions

General Requirements

- Statement of Purpose: In 500 words or less, please write a statement that addresses how your past professional/academic experiences have shaped your current professional goals. You may wish to discuss work in your intended field, your plans for a professional career, and/or how you developed your interest or knowledge in your chosen subject. What are your reasons for undertaking graduate study in the Master's of Professional Studies program in Clinical Psychological Science at the University of Maryland, College Park?
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students) (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements)

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Admissions Interview

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

The Masters in Clinical Psychological Science program offers Fall admissions only. The application deadline for Fall enrollment is the March 1 prior to the Fall enrollment date. International student application materials are due February 1. Invitations to interview for the program will be sent to select students by late March. UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). Additional Requirements can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/clinical-psychological-science/apply#International

Applicants are asked to submit an essay, undergraduate transcripts, two letters of recommendation, and a resume or CV. GRE scores are not required.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	1 Mar
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	1 Feb

Other Deadlines: Please visit the program website at http://ter.ps/oesclinpsyc

Requirements

- Clinical Psychological Science, Master of Professional Studies (M.P.S.) (p. 126)

Facilities and Special Resources

Classes are held at the College Park campus in the evenings, after traditional working hours.

Communication, Master of Arts (M.A.)

The Department of Communication is not currently admitting students whose terminal degree objective is the M.A.

Communication, Doctor of Philosophy (Ph.D.)

The Ph.D. requires:

1. course work to prepare the student for a research program in communication, including work in a cognate discipline, and research methods;
2. a comprehensive examination that certifies mastery of disciplinary knowledge and preparation for independent research; and
3. completion and successful defense of a dissertation that advances knowledge of communication.

Requirements for Students entering with a B.A./B.S. in Communication

Course	Title	Credits
Core Requirements		
COMM700	Introduction to Graduate Study in Communication	3
Cognate Area Outside Department		6
Area of Specialization		15
Select one of the following:		3
COMM602	Communication Theory	
COMM630	Seminar in Public Relations Management	
COMM652	Contemporary Rhetorical Theory	
Select one of the following course sequences:		12
Quantitative:		
COMM701	Quantitative Methods in Communication Research	
Select nine additional credits in quantitative methods and statistics		
Historical/Critical:		
COMM711	Historical/Critical Methods in Communication Research	
COMM712	Advanced Historical/Critical Methods in Communication Research	
Select six additional credits in methods and foundations		
Qualitative:		
COMM714	Introduction to Qualitative Methods in Communication Research	
COMM715	Advanced Qualitative Methods in Communication Research	
Select six additional credits in methods and foundations		
Dissertation Research Requirements		
COMM899	Doctoral Dissertation Research	12
Total Credits		51

Requirements for Students entering with a M.A. in Communication

Course	Title	Credits
Core Requirements		
Cognate Area Outside Department		6

Area of Specialization		9
Select one of the following course sequences:		12
Quantitative:		
COMM701	Quantitative Methods in Communication Research	
Select nine additional credits in quantitative methods and statistics		
Historical/Critical:		
COMM711	Historical/Critical Methods in Communication Research	
COMM712	Advanced Historical/Critical Methods in Communication Research	
Select six additional credits in methods and foundations		
Qualitative:		
COMM714	Introduction to Qualitative Methods in Communication Research	
COMM715	Advanced Qualitative Methods in Communication Research	
Select six additional credits in methods and foundations		
Dissertation Research Requirements		
COMM899	Doctoral Dissertation Research	12
Total Credits		39

Communication (COMM)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of Communication takes as its intellectual focus the strategic use of discourse in the public sphere. Faculty members and graduate students in the Department pursue and produce research that spans a wide range of the Communication discipline, generally focused in three broad curriculum areas:

- Communication Science & Social Cognition,
- Public Relations & Strategic Communication, and
- Rhetoric & Political Culture.

The Department encourages applications for graduate study from students wishing to pursue interests identified within these foci. The graduate program in Communication is designed for students whose educational objective is the Ph.D. degree (currently the program does not admit students whose degree objective is the M.A.) Most graduates of the doctoral program pursue academic careers; however, some work in public policy research and other professions requiring highly developed research skills.

Financial Assistance

Most departmental financial aid is in the form of graduate assistantships. However, a limited number of fellowships are available.

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Website: http://www.comm.umd.edu

Relationships: English Language and Literature (ENGL) (p. 185)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))[1]

[1] For this program, the TOEFL/IELTS is required of all international applicants (except applicants from the United Kingdom, Commonwealth Caribbean, Ireland, Canada, Australia, or New Zealand whose first language is English).

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample: This could be a research paper.
- Description of Research Interests: Describe in detail your primary research interests with reference to specific studies you have conducted in the past and/or plan to carry out in the future; discuss your future career goals; 2-4 pages; upload to the Uploads Requirements section.

Students must hold a Bachelor's or Master's degree (or the equivalent) prior to enrollment in the Ph.D. program. Although most applicants to the program will have earned a degree in the communication field, others with an interest in studying communication may be admitted (with the possibility of additional courses assigned to remedy deficiencies). Admission to the Ph.D. program is based on the student's prior academic record, GRE scores, letters of recommendation, statement of purpose

and research interests, sample of scholarly writing, and other information relevant to the applicant's likelihood of successfully completing the program.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	9 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	9 Jan

Other Deadlines: Please visit the program website at http://www.comm.umd.edu

Requirements

- Communication, Doctor of Philosophy (Ph.D.) (p. 127)
- Communication, Master of Arts (M.A.) (p. 127)

Facilities and Special Resources

The Department of Communication houses a Center for Health and Risk Communication (http://www.healthriskcenter.umd.edu); a Center for Political Communication and Civic Leadership (http://www.comm.center.umd.edu); and an Oral Communication Center (https://www.comm.umd.edu/undergraduate/OCC). The campus provides extensive computer resources and excellent library collections in communication. In addition, the Washington metropolitan area provides research and laboratory facilities for studying communication unmatched by other departments in the discipline.

Communication Management, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Communication Management (Z045)

Graduate Certificate Program
College: Arts and Humanities

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Website: http://www.comm.umd.edu

Admissions

Admissions Information

This certificate is not currently accepting students. Please visit our program listing (p. 18) to view other certificates.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not accepting applications for Fall 2018	Not accepting applications for Fall 2018
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not accepting applications for Fall 2018	Not accepting applications for Fall 2018

Other Deadlines: Please visit the program website at http://www.comm.umd.edu

Requirements

- Communication Management, Post-Baccalaureate Certificate (P.B.C.) (p. 129)

Community Counseling, Master of Arts (M.A.)

Please visit the department website.

Community Counseling, Master of Education (M.Ed.)

Please visit the department website.

Community Counseling (COCM)

Graduate Degree Program
College: Education

Website: http://www.education.umd.edu

Admissions

Admissions Information

This program is not currently accepting students. Please visit our program listing (p. 18) to view other programs.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not accepting applications for Fall 2018
International Applicants	

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not accepting applications for Fall 2018

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Community Counseling, Master of Arts (M.A.) (p. 129)
- Community Counseling, Master of Education (M.Ed.) (p. 129)

Community Planning, Master of Community Planning (M.C.P.)

Non-thesis only (capstone project required): 48 credits

Graduation requires satisfactory completion of 48 credits of course work. The 24 credits in core courses introduce students to the foundations of city and regional planning, research methods, planning process, planning history and theory, and the physical and socio-economic functions of cities and regions. Nine additional credits are required for a specialization. Specializations include community development, housing, economic development, international planning, land use / environmental planning, social planning, historic preservation, and transportation planning. A studio and internship are required. Courses are listed under URSP. The MCP program accepts up to nine credits from other graduate programs. Applicants to this program should use the CMPL program code.

Course	Title	Credits
Core Requirements		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP688	Recent Developments in Urban Studies (URSP688Z - Planning and Design in the Multicultural Metropolis)	3
or URSP673	Community Development	
URSP688	Recent Developments in Urban Studies (URSP688L - Planning Technology)	3
URSP708	Community Planning Studio	6
URSP709	Field Instruction	0
Area of specialization		9
Electives		9
Specialization Options		
Select one of the following options:		
Local and Regional		
Economic Development		
Land Use and Environmental Planning		
Transportation Planning		
Total Credits		48

Community Planning (CMPL)

Graduate Degree Program
College: Architecture

Abstract

The Urban Studies and Planning Program offers graduate study leading to the Master of Community Planning (MCP) degree. (The School of Architecture, Planning and Preservation, in which the MCP program is located, offers a Ph.D. in Urban and Regional Planning and Design -- see URPD for details). The MCP Program is accredited by the Planning Accreditation Board of the American Institute of Certified Planners and the Association of Collegiate Schools of Planning. Dual Masters degrees in Planning and Architecture, Planning and Historic Preservation, and Planning and Landscape Architecture are offered. There is a transfer of credit agreement with the School of Law on the Baltimore campus as part of a joint JD and MCP program. There is also a cooperative program with the PhD program in Policy Sciences at the UMBC campus. Entering students have diverse academic backgrounds, such as architecture, fine arts, English, history, business, geography, sociology, economics, and political science. The Program's faculty specialize in metropolitan and regional planning, housing, transportation planning, environmental and land use planning, social policy, quantitative planning methods, urban design, and economic development planning. Employment opportunities remain strong for graduates in a highly competitive field. The Baltimore-Washington metropolitan region offers diverse employment potential in urban planning and program management in the public, private, and non-profit sectors.

Financial Assistance

Aside from student loans through the university, MCP students are eligible to apply for graduate assistantships with URSP and the National Center for Smart Growth Research and Education. MCP applicants who are also Peace Corps veterans are eligible to apply for the Shriver Peaceworker fellowship program that is administered by the University of Maryland Baltimore County. Please note that competition is high for these financial awards. The program also maintains a list of internships, and many of our students work in part- or full-time jobs while completing the program. Program classes are scheduled to begin at 4:00 p.m. and 7:00 p.m. to accommodate our working students.

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Website: http://www.arch.umd.edu

Courses: ARCH HISP URSP

Relationships: Architecture (ARCH) (p. 50)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

The application process consists of the following:

- First, fill out the on-line application for the University of Maryland Graduate School. The administrative code for the Community Planning program is "CMPL."
- Second, submit all transcripts, three professional letters of recommendation, statement of purpose, resume, official GRE test scores, and portfolio as part of the application.

All applicants must have a bachelor's degree from an accredited institution. There is no restriction on the applicants' previous field of study, and indeed we encourage diversity in all senses

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Community Planning, Master of Community Planning (M.C.P.) (p. 130)

Facilities and Special Resources

The University of Maryland is an excellent location for the pursuit of community planning, and graduate students are encouraged to take advantage of the opportunities. The university is eight miles from the incomparable library and research facilities of Washington, D.C. In the nations's capital, UMCP graduate students have access to, among other resources, the Library of Congress, the specialized collections of professional associations and international organizations, and agencies at all levels of government. The College Park campus is a 45-minute drive from Baltimore City, whose planning programs have gained national attention. At least two planning studio courses are offered each year, in either Baltimore, the Washington metropolitan area, or an international setting. Baltimore city and Washington, D.C. are ideal laboratories for students interested in research on urban issues and planning.

Urban Studies and Planning is one of five graduate degree programs in the University's School of Architecture, Planning, and Preservation. The School administers the National Center for Smart Growth Research and Education, which involves faculty and graduate students from several campus units in: multi-disciplinary research on the fiscal, environmental and social impacts of alternative development patterns; evaluation of growth management strategies (with a focus on Maryland's Smart Growth programs); technical assistance to state agencies and local jurisdictions; and training programs for federal program managers and state and local officials.

Community Planning and Historic Preservation, Master of Community Planning and Master of Historic Preservation (dual degree) (M.C.P. and M.H.P.)

Non-thesis only: 63 credits required

Course	Title	Credits
Core Requirements		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP690	(Preservation Management and Practice)	2
HISP710	Final Project in Historic Preservation I	1
HISP711	Final Project in Historic Preservation II	2
HISP650	Historic Preservation Studio Workshop	6
or URSP708	Community Planning Studio	
Internship		0
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP688	Recent Developments in Urban Studies (URSP 688Z - Planning and Design in the Multicultural Metropolis)	3
or URSP673	Community Development	
URSP688	Recent Developments in Urban Studies (URSP688L Planning Technology)	3

URSP Elective	3
Total Credits	63

Community Planning and Historic Preservation (CPHP)

Graduate Degree Program
College: Architecture

Abstract

The dual degree combines course work from the Historic Preservation and Urban Studies and Planning programs to enable a student to complete both the Master of Historic Preservation and Master of Community Planning degrees with fewer credits than it would take to complete the two separately.

Students of the dual-degree program are ideally prepared to practice at the intersection of planning and preservation, disciplines that have long had close ties. For example, the Maryland Historical Trust, Maryland's State Historic Preservation Office is housed with the state's planning department. Similarly, preservation is imbedded in the planning offices in Baltimore City, and county's such as Prince Georges and Montgomery. Graduates of this program are prepared to practice in either discipline (a strength in times of economic recession) and, more importantly, are able to bring their special knowledge and understanding to preservation planning issues in communities across the state and nation.

Financial Assistance

The School of Architecture, Planning, and Preservation offers a limited and varying number of teaching and research assistantships, scholarships, fellowships, and internships. Applicants should apply for financial assistance when submitting the application for admission.

Scholarship determinations are made at the time of application and admission. Scholarships are generally awarded on a per course basis and commitments are made at the time of admission and apply to the entire program, subject to academic performance. Periodically there are named scholarships provided by various organizations or companies.

In addition, there are work opportunities both on, and off campus, and they are relatively plentiful. However, students in the dual degree program may find it difficult to complete their degree requirements timely if they are working off campus, or more than 10 hours per week.

Applicants should inquire as to the availability of funding for the term they are starting.

Contact

Find additional information on program offerings, degree requirements, admissions, and financial aid on the School's Web site (www.arch.umd.edu). Schedule a visit and tour online at: http://arch.umd.edu/arch/prospective-students-arch. Sign up to receive an invitation to our Graduate Open House online at: http://arch.umd.edu/mapp/graduate-inquiry-form

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Relationships: Architecture (ARCH) (p. 50) Real Estate Development (MPRE) (p. 350)

Admissions

General Requirements

- Statement of Purpose: In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample: A writing sample of at least 10-30 pages. This can be previous individual academic or professional work. It does not necessarily have to be related to historic preservation or community planning, however a related topic is preferred. The writing sample should demonstrate the ability to analyze a problem/question and clearly communicate your findings. Upload to the Writing Sample of the Uploads Requirements section of the online application.
- Must be admitted by both programs to pursue dual degree.

The administrative code for the dual degree of Master of Community Planning and Master of Historic Preservation is "CPHP." Applicants must be admitted by both programs to pursue this dual degree but only one application is required.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Community Planning and Historic Preservation, Master of Community Planning and Master of Historic Preservation (dual degree) (M.C.P. and M.H.P.) (p. 131)

Facilities and Special Resources

The School of Architecture, Planning and Preservation is ideally located between Washington, DC, and Baltimore and surrounded by a number of historic communities and a varied physical environment. The resulting opportunity for community planning and historic preservation is unsurpassed.

The School's library contains some 57,000 monographs and 6,000 current periodicals, making it one of the major architectural libraries in the nation. The National Trust Library for Historic Preservation, housed in McKeldin Library, contains 11,000 volumes and 450 periodical titles. The Colvin Institute holds the entire library offerings of the Urban Land Institute and access to all the case studies published by ULI. The interdisciplinary National Center for Smart Growth Education and Research is based in the School offering perspectives and opportunities to engage important issues facing urban and regional planning as well as historic preservation.

Community Planning and Law, Master of Community Planning and Juris Doctorate (Dual Degree) (M.C.P. and J.D.)

Non-thesis only: 48 credits required for the M.C.P.

The University of Maryland School of Law on the Baltimore campus (UMB) will accept up to 9 credits of MCP coursework towards the J.D. degree, and the Urban Studies and Planning Program will accept up to 9 credits of J.D. coursework towards the MCP degree. Applicants must apply to each program separately and be accepted by both programs. Credits from the MCP program can be transferred to the Law program only if they are taken while the student is enrolled in the Law program, and vice versa. Applicants interested in this joint program should use the LCPL code when applying to the Urban Studies and Planning Program.

Course	Title	Credits
Core Requirements		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP688	Recent Developments in Urban Studies (URSP688Z - Planning and Design in the Multicultural Metropolis)	3
or URSP673	Community Development	
URSP608		3
URSP708	Community Planning Studio	6
URSP709	Field Instruction	0
Electives		9
Specialization Options		
Select one of the following options:		9
Local and Regional Economic Development		
Land Use and Environmental Planning		
Transportation Planning		
Total Credits		48

Community Planning and Law (LCPL)

Graduate Degree Program
College: Architecture

abstract

The University of Maryland School of Law on the Baltimore campus (UMB) will accept up to 9 credits of MCP coursework towards the JD degree, and the Urban Studies and Planning Program will accept up to 9 credits of JD coursework towards the MCP degree. This means that students who complete both programs can save up to 18 credits. Applicants must apply to each program separately and be accepted by both programs. Only grades of B or better may be transferred. Credits from the MCP program can be transferred to the Law program only if they are taken while the student is enrolled in the Law program and vice versa. This means that students cannot take advantage of the transfer of credits if they have already completed either of the programs.

Contact

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Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume

- Must apply to the M.C.P. and law programs separately and be accepted by both programs.

Applicants for the dual degree in Community Planning/Juris Doctor should use following four-letter code on the online appication: LCPL

For more information about the law program, visit The University of Maryland School of Law (https://www.law.umaryland.edu). For the statement of purpose, in addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs. The Law School Admission Test (LSAT) is required and must be submitted directly to the Maryland School of Law.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Community Planning and Law, Master of Community Planning and Juris Doctorate (Dual Degree) (M.C.P. and J.D.) (p. 133)

Community Planning and Real Estate Development (CPDV)

Graduate Degree Program
College: Architecture

CONTACT

Find additional information on program offerings, degree requirements, admissions, and financial aid on the School's Web site (www.arch.umd.edu).

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Admissions

Type of Applicant	Fall Deadline
Domestic Applicants	Please contact the department
US Citizens and Permanent Residents	
International Applicants	Please contact the department
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	

Requirements

- Community Planning and Real Estate Development, Master of Community Planning and Master of Real Estate Development (dual degree) (M.C.P. and M.R.E.D.) (p. 134)

Community Planning and Real Estate Development, Master of Community Planning and Master of Historic Preservation (dual degree) (M.C.P. and M.R.E.D.)

Non-thesis only: 60 credits required

Course	Title	Credits
Required courses:		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP673	Community Development	3
URSP688	Recent Developments in Urban Studies (URSP688L - Planning Technologies)	3
URSP708	Community Planning Studio	6
URSP709	Field Instruction	0
RDEV600	Principles and Practice of Real Property Development	3
RDEV603	Introduction to Real Property Finance	3
RDEV610	Real Property Development Law and Ethics	3
RDEV620	Market Analysis for Real Property Development	3
RDEV630	Real Property Finance and Investment	3
RDEV640	Principles of Urban Design for Real Property Developers	3
RDEV650	Essentials of Design and Construction Management for Development Professionals	3
RDEV660	Commercial Leasing for Real Property Developers	3

RDEV690	Capstone Project: Real Property Feasibility Study	3
RDEV6xx Elective		3
Total Credits		60

Comparative Literature, Doctor of Philosophy (Ph.D.)

The Ph.D. degree normally entails at least 18 credits of course work (beyond M.A. courses) and 12 credits of dissertation research. Students take one course in Methodology (3 credits); one course in Theory (3 credits); two courses in Early Modern Literature (6 credits); and two courses in Modern Literature (6 credits). The designations early modern and modern remain flexible to accommodate different literary histories. In each of the two general periods, at least one course must be taken in the English Department in Anglophone or Comparative Literature and at least one course outside of the English Department in another language/literature. Students can use six credits of MA work to satisfy distribution requirements (though not total credit number requirements). Advising will address the depth, breadth, and coherence of each student's course plan and, if necessary, coordination among different histories of the early modern and modern.

Course	Title	Credits
Core Requirements		
ENGL602	Critical Theory and Literary Criticism	3
ENGL611	Approaches to College Composition	3
Select four additional courses		12
Dissertation Research Requirements		
CMLT899	Doctoral Dissertation Research	12
Total Credits		30

Comparative Literature (CMLT)

Graduate Degree Program
College: Arts and Humanities

Abstract

A small, elite PhD degree program housed in the Department of English, the Comparative Literature Program is committed to the comparative and transnational study of literature and other media. Combining its own dynamic resources with those of the English Department and other units in the College of Arts and Humanities, the Program supports a wide range of interests, including Western Hemispheric and Transatlantic Studies, Film, Early Modern Studies, Classical Reception, and Diasporic and Postcolonial Studies. Students in the Program work in at least two languages and national literatures, one of them Anglophone. The Comparative Literature PhD Program complements the current PhD Program in English, giving students a place to pursue true comparative studies. Students seeking admission to the PhD Program in Comparative Literature must demonstrate advanced language proficiency before entry into the Program, and commit themselves to achieving a high degree of intellectual expertise in two or more languages and national literatures. Graduates are as likely to find academic positions in departments of foreign languages as they are to find them in English. A doctoral degree in Comparative Literature can uniquely prepare them for a profession that more and more studies literatures and cultures within a globalized, transnational context. Students are admitted to CMLT with a Masters degree in a language or literature in hand. Exceptional candidates without the MA may be admitted to the program with the understanding that once they complete an MA degree at UMD (in the English Department or in another relevant language department) they will be directly admitted to the program in CMLT.

Financial Assistance

Comparative Literature students are eligible for graduate assistantships and university fellowships. Depending on available resources and the student's own expertise, teaching and research assistantships may be available either in Comparative Literature or in an affiliated department.

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Website: http://www.english.umd.edu

Courses: CMLT

Keywords: Cross-cultural, interdisciplinary studies in literature, media, and the arts in light of textual and critical theory. Students design individual programs in a range of fields.

Relationships: English Language and Literature (ENGL) (p. 185)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- Academic CV
- Writing Sample: A single sample of critical writing of approximately 12-20 pages. While we encourage you to submit your best writing sample, we prefer a writing sample in your declared field of interest. The writing sample should include an updated works cited page to help us evaluate your critical and theoretical familiarity with a field, a period or a genre. (uploaded to the Uploads Requirements section of the application)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationcmlt.pdf)
- Master's degree

Applicants should have a strong background in arts and humanities. Students will not be admitted to the program without demonstrated proficiency in English and at least one other language. Each student

must submit a critical writing sample (in English), three letters of recommendation, evidence of language proficiency, and GRE scores. International applicants must also submit TOEFL scores. **Students are admitted to CMLT with a Masters degree in a language or literature in hand. Exceptional candidates without the MA may be admitted to the program with the understanding that once they complete an MA degree at UMD (in the English Department or in another relevant language department) they will be directly admitted to the program in CMLT.**

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	14 Dec

Other Deadlines: Please visit the program website at http://www.english.umd.edu

Requirements

- Comparative Literature, Doctor of Philosophy (Ph.D.) (p. 135)

Facilities and Special Resources

The Comparative Literature Program combines the benefits of a small department with the opportunities available at a large research university located in suburban Washington, D.C. Students have access to such University resources as the rare books and special collections of McKeldin Library, the Program for Africa and Africa in the Americas, the Women's Studies Graduate Certificate program, and the Meyerhoff Center for Jewish Studies. Area resources include the extensive archival collections of the Library of Congress, the U.S. Archives, and the Folger Institute, as well as museums, galleries, embassies and cultural institutions in the Washington area and in the Baltimore-Philadelphia-New York corridor.

Computational Harmonic Analysis, Post-Baccalaureate Certificate (P.B.C.)

The Norbert Wiener Center offers a specific Graduate Certificate concentration in Computational Harmonic Analysis. This 12-credit program is tailored to working engineers and scientists wishing to advance their understanding of the latest Fourier, Wavelet, and Time-Frequency Harmonic Analysis methods and algorithms. The program will include the following courses:

Course	Title	Credits
MAIT633		3
MAIT623 & MAIT624	Modern Mathematical Methods of Signal and Image Processing I and	6
A fourth elective selected with the approval of the student's advisor		3
Total Credits		12

Coursework must be completed with a GPA of 3.0 or higher.

Computational Harmonic Analysis (Z023)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

This certificate is not currently accepting applications. Please visit our program listing (p. 18) to view other certificates.

Website: http://www.norbertwiener.umd.edu

Admissions

This certificate is not currently accepting applications. Please visit our program listing (p. 18) to view other certificates.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Program not currently accepting applications	Program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.norbertwiener.umd.edu

Requirements

- Computational Harmonic Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 136)

Computational Methods in Atmospheric & Oceanic Science, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Core Requirements		
AOSC630	Statistical Methods in Meteorology and Oceanography	3
AOSC652	Analysis Methods in Atmospheric and Oceanic Science	3
Select two additional courses approved by advisor		6
Total Credits		12

Computational Methods in Atmospheric & Oceanic Science (Z048)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Website: http://www.aosc.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Jun	17 Nov
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.aosc.umd.edu

Requirements

- Computational Methods in Atmospheric & Oceanic Science, Post-Baccalaureate Certificate (P.B.C.) (p. 136)

Computer Networking, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Students must choose at least two courses from the 749-level series of special topics. The remaining two courses can be any of the following:

Course	Title	Credits
Core Requirements		
ENTS689	Special Topics in Telecommunications (ENTS689G - Design and Analysis of Communication Networks)	3
ENTS689	Special Topics in Telecommunications (ENTS689N - Network Programming)	3
ENTS649	Special Topics in Networking	3
ENTS749	Advanced Topics in Networking	3
Total Credits		12

Computer Networking (Z117)

Graduate Certificate Program
College: Engineering

Abstract

The Certificate in Computer Networking will only be available to current ENTS students. It will allow ENTS students to have the option of enhancing their MS degree with specific technical knowledge and also enable them to remain competitive in the marketplace with graduates from similar degree programs at peer institutions.

Financial Assistance

Since the Master's in Telecommunications Program does not normally offer financial support in the form of graduate assistantships, many of our students find assistantships in other units, especially non-academic units, which do not have graduate students.

CONTACT

Master's in Telecommunications Program Office
2433 A.V. Williams Building
6223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu/

Courses: ENTS

Relationships: Electrical and Computer Engineering (ENEE) (p. 168)

Admissions
Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website

Other Deadlines: Please visit the program website at http://www.telecom.umd.edu/

Requirements

- Computer Networking, Post-Baccalaureate Certificate (P.B.C.) (p. 137)

Computer Science, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

Students completing the non-thesis option must complete 30 credits of coursework, comprehensive examinations, and complete a scholarly paper. Students following the thesis option must complete 24 credits of coursework, and 6 credits of master's thesis research.

Course	Title	Credits
Core Requirements		
At least four M.S. qualifying computer science courses at the 600-800 level in four of the eight areas of study are required. A total of 21 credits in CMSC courses must be taken.		24
Thesis or Non-Thesis Requirements		
Select one of the following options:		6
Thesis Option:		
CMSC799	Master's Thesis Research	
Non-Thesis Option:		
Complete a scholarly paper		
Six additional credits of coursework		
Total Credits		30

Computer Science, Doctor of Philosophy (Ph.D.)

The program milestones include a six-course qualifying sequence plus two electives, a preliminary oral examination on a dissertation proposal and reading list in three related areas, and the dissertation defense. The number and variety of courses offered each semester enable students and their advisors to plan individualized programs.

Course	Title	Credits
Core Requirements		
Select six 600-800 level courses spread over at least four areas, with no more than three in any one area.		18
Select two additional 600-800 level courses		6
CMSC798	Graduate Seminar in Computer Science (CMSC798F - How to Conduct Great Research)	1
Dissertation Research Requirements		
CMSC899	Doctoral Dissertation Research	12
Total Credits		37

Computer Science (CMSC)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Computer Science Department's graduate program is ranked among the top in the nation and in the top ten among public universities. Both M.S. and Ph.D degrees are offered, and almost all full-time students receive financial aid in the form of assistantships, fellowships, and grants. The Department has strong research programs in the following areas: artificial intelligence, computer systems and networking, database systems, programming languages, software engineering, scientific computing, algorithms and computation theory, computer vision, geometric computing, graphics, human-computer interaction, and bioinformatics.

Financial Assistance

Financial aid, in the form of teaching assistantships, research assistantships, and fellowships, is offered to qualified applicants. Almost all full-time students receive some type of financial aid.

Contact

Graduate Office
Department of Computer Science
3175 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2662
Email: csgradof@cs.umd.edu

Website: http://www.cs.umd.edu

Courses: CMSC

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations (optional)
- Maryland Max Planck Ph.D. Program: Students interested in applying to the Maryland Max Planck Ph.D. Program in Computer Science should follow the admissions instructions for the program (https://www.cs.umd.edu/maryland-max-planck/admissions).

Admission and degree requirements specific to the graduate programs in computer science are described on our website, http://www.cs.umd.edu/Grad/catalog.html. A strong background in mathematics and theoretical computer science is necessary.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	14 Dec	3 Oct (for current UMD students only)
International Applicants		

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	14 Dec	3 Oct (for current UMD students only)

Other Deadlines: Please visit the program website at http://www.cs.umd.edu

Requirements

- Computer Science, Doctor of Philosophy (Ph.D.) (p. 138)
- Computer Science, Master of Science (M.S.) (p. 138)

Facilities and Special Resources

The computer science department, located in the A.V. Williams building, provides general purpose computing support to advance the academic and research mission of the department. The department operates a data center in the AV Williams building with multiple 10 Gbps connections to the campus and national research networks. In addition to the primary data center, the department oversees a co-location facility for research groups wanting hands-on management of their own specialized equipment.

General purpose computing is provided via a RedHat Enterprise Virtualization environment. The system provides four compute nodes, each with at least 16 cores and 128GB of RAM. The cluster has 14 TB of shared disk. Nodes are connected to each other and the file system by multiple 10 Gbps Ethernet links.

Computing Systems, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
ENTS689	Special Topics in Telecommunications (ENTS689A - Algorithms and Data Structures)	3
ENTS669	Special Topics in Computing (ENTS669A - Embedded Systems)	3
ENTS669	Special Topics in Computing (ENTS669B - Distributed Systems in a Virtual Environment)	3
ENTS669	Special Topics in Computing (ENTS669D - Introduction to Machine Learning)	3
Total Credits		12

Computing Systems (Z118)

Graduate Certificate Program
College: Engineering

abstract

The aim of the Graduate Certificate in Computing is to extend the knowledge and skills of our students in the direction of computing, including algorithms and data structures, embedded and high-performance computing and machine learning.

CONTACT

Master's in Telecommunications Program Office

2433 A.V. Williams Building
University of Maryland,
College Park, MD 20742
Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu

Admissions

The Certificate in Computing Systems is only available to current Telecommunication students.

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	N/A	N/A

Requirements

- Computing Systems, Post-Baccalaureate Certificate (P.B.C.) (p. 139)

Consecutive Interpreting, Post-Baccalaureate Certificate (P.B.C.)

21 credits required

The Graduate Certificate of Professional Studies in Consecutive Interpreting (GCPS in Consecutive Interpreting) is designed to equip you with the knowledge and skills required for entry-level work in the interpreting profession. Examples include serving as dialogue interpreters for non-specialized content in community, health, legal, and political settings. You will begin to develop high-level skills in consecutive interpreting (oral rendering after the speaker pauses) and will be grounded in the tenets of the profession, including professional conduct and ethics, as you are guided through the steps needed to advance your professional skill set.

The GCPS in Consecutive Interpreting is a one-year 21-credit program offering instruction in the fundamental skills of consecutive interpreting in interpreting studies, the interpreting profession, and intercultural communication.

Two Languages

Course	Title	Credits
Core Requirements		
COMM609	Fundamentals of Interpreting	4
COMM610	Introduction to Translation and Interpreting Studies	3
COMM683	Intercultural Communication Theory	3
COMM619	Consecutive Interpretation	4
COMM730	Seminar in Health Communication	3
or COMM762	The Rhetoric of Political Institutions	
Select up to four credits of the following electives:		4
COMM641	Introduction to Computer-Assisted Translation	

COMM798	Independent Study (Intensive Writing in English)	
COMM798	Independent Study (Public Speaking)	
COMM639	Fundamentals of Translation	
COMM629	Introduction to Simultaneous Interpretation	
COMM730	Seminar in Health Communication (if not taken to fulfill requirement)	
COMM762	The Rhetoric of Political Institutions (if not taken to fulfill requirement)	
Total Credits		21

Three Languages

Course	Title	Credits
Core Requirements		
COMM609	Fundamentals of Interpreting	6
COMM610	Introduction to Translation and Interpreting Studies	3
COMM683	Intercultural Communication Theory	3
COMM619	Consecutive Interpretation	6
COMM730	Seminar in Health Communication	3
or COMM762	The Rhetoric of Political Institutions	
Total Credits		21

Consecutive Interpreting (Z080)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The Graduate Certificate of Professional Studies in Consecutive Interpreting (GCPS in Consecutive Interpreting) is designed to equip you with the knowledge and skills required for entry-level work in the interpreting profession. Examples include serving as dialogue interpreters for non-specialized content in community, health, legal, and political settings. You will begin to develop high-level skills in consecutive interpreting (oral rendering after the speaker pauses) and will be grounded in the tenets of the profession, including professional conduct and ethics, as you are guided through the steps needed to advance your professional skill set.

Contact

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2123 Skinner Building
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College Park, MD 20742
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Interpreting and Translation Program
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Telephone: 301.314.1205
Email: ycarver@umd.edu

Website: http://www.gsit.umd.edu

Relationships: Interpreting (MPIN) (p. 263), Translation (MPTR) (p. 416), Translation (Z079) (p. 417)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements)): A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.

Program-Specific Requirements

- Letters of Recommendation (3)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105andz106.pdf)
- Proof of residency: A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.
- Admissions tests (contact oes@umd.edu)

For complete Admission Information, please visit: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/interpreting-and-translation-gsit/apply

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 May
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar

Other Deadlines: Please visit the program website at http://www.gsit.umd.edu

Requirements

- Consecutive Interpreting, Post-Baccalaureate Certificate (P.B.C.) (p. 139)

Corporate Innovation, Master of Professional Studies (M.P.S.)

30 credits required

Course	Title	Credits
Core Requirements		
ENES662	Innovative Ideas and Concept Development	3

ENES663	Strategies for Managing Innovation	3
ENES664	Business Modeling and Customer Validation	3
ENES665	Innovative Thinking	3
Data Analysis and Decision Making		3
Managing Product Development and Production		3
Marketing and Selling Innovations		3
Negotiating and Problem Solving		3
Financing Innovation and Growth		3
Building and Leading Innovative Organizations		3
Total Credits		30

Website: http://www.oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/corporate-innovation

Corporate Innovation (MPCI)

Graduate Degree Program
College: Engineering

Abstract

The Master of Professional Studies in Corporate Innovation (MPS-CI) prepares graduates to apply newly gained insights and acquired competencies to real-world innovation management challenges, enabling students to navigate the innovation value chain from idea generation to product development and commercialization. MPS-CI is offered through an online learning environment within a 12-week calendar format benefitting working professionals with flexibility, convenience, and accessibility.

MPS-CI's curriculum delivers an incubator experience grounded in sound theory and rigorous analysis associated with high-quality graduate education. The program offers a continuum of new venture creation within established companies and large organizations, including iterating ideas, testing business models, and launching high-potential ventures.

MPS-CI is a 30-credit, 10-course graduate program that may be completed in 15 months by enrolling in two 3-credit courses over the course of five 12-week terms. Students are admitted as a cohort and follow the plan of study as outlined below.

The MPS-CI prepares students to:

- Think beyond current paradigms in order to discover innovation needs and envision impact through strategic idea and concept development (Term 1).
- Leverage their ideas for new corporate ventures to create sustainable business models aligned with customer needs and wants in competitive marketplaces (Term 2).
- Understand the value of data collection and analysis for decision making, and how to translate product and service ideas into marketable solutions (Term 3).
- Understand how to manage commercialization challenges efficiently and effectively through negotiations and problem solving (Term 4).
- Understand how to lead the creation and launch of corporate ventures through appropriate business development, risk management, financing, and value extraction strategies (Term 5).

Contact

Office of Extended Studies

0132 Main Administration Building
7901 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7762
Email: oes@umd.edu

Website: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/corporate-innovation

Courses: ENES

Relationships: Technology Entrepreneurship (MPTE) (p. 406), Technology Entrepreneurship (Z103) (https://academiccatalog.umd.edu/graduate/programs/technology-entrepreneurship-z103)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program Specific Requirements

- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	14 Jun	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	14 Jun	N/A

Other Deadlines: Please visit the program website at http://www.oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/corporate-innovation

Requirements

- Corporate Innovation, Master of Professional Studies (M.P.S.) (p. 140)

Counseling & Personnel Services, Certificate of Advanced Study (C.A.S.)

This certificate is not currently accepting applications.

Counseling & Personnel Services (Z901)

Graduate Certificate Program
College: Education

This certificate is not currently accepting students. Please visit our program listing (p. 18) to view other certificates.

Website: http://www.education.umd.edu

Admissions

This certificate is not currently accepting students. Please visit our program listing (p. 18) to view other certificates.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Counseling & Personnel Services, Certificate of Advanced Study (C.A.S.) (p. 141)

Counseling Psychology, Master of Arts (M.A.)

Thesis only: 30 credits required

Students pursing doctoral degrees may earn the M.A. with thesis within the doctoral program while progressing to the Ph.D. The applicant should consult the web page associated with specific CoPE program areas of specialization for further information concerning the relevant entry-level requirements and curriculum.

Course	Title	Credits
Core Requirements		
Statistics courses		6
EDCP799	Master's Thesis Research	6
or PSYC799	Master's Thesis Research	
Remainder of coursework		18
Total Credits		30

Counseling Psychology, Doctor of Philosophy (Ph.D.)

Ph.D. students are expected to attain advanced skills as both practitioners and researchers in their area of specialization. All doctoral students are required to take advanced courses in statistics and research design. Because of the highly specialized nature of each of the doctoral programs, applicants should consult the web page for specific areas of specialization. These pages describe specific course and fieldwork requirements, the nature of the comprehensive examination required for completion of the program, and the dissertation requirements.

Students must complete courses in the following five areas:

Course	Title	Credits
Individual Difference:		3
PSYC611	Advanced Developmental Psychology	
or PSYC612	Affective Science Perspectives on Temperament & Personality	
or EDHD720	Social Development and Socialization Processes	
Biological Bases of Behavior:		
PSYC606	Human Biopsychology	3
or EDHD775	Human Development and Neuroscience	
Cognitive or Affective Bases of Behavior:		
PSYC607	Advanced Topics in Human-Learning and Cognitive Psychology	
or EDHD721	Cognitive Development and Learning: An Introduction	
or EDHD760	Advanced Educational Psychology	
Social Bases of Behavior:		
PSYC604	Fundamentals of Social Psychology	3
History and Systems:		
EDCP789	Advanced Topics in Counseling and Personnel Services (EDCP789F - History of Mental Health and Psychological Science)	3
or PSYC610	Historical Viewpoints and Current Theories in Psychology	
Remainder of Coursework:		
EDMS646	General Linear Models I	3
EDMS651	General Linear Models II	3
PSYC629	Clinical Laboratory (variable credits)	1-3
or EDCP789	Advanced Topics in Counseling and Personnel Services	
PSYC638	Externship in Professional Psychology (variable credits)	1-3
or EDCP888	Apprenticeship in Counseling and Personnel Services	
PSYC/EDCP680		3
PSYC/EDCP682	Counseling Psychology Didactic-Practicum in Group Interventions	3
PSYC/EDCP685		3
PSYC/EDCP686		3
PSYC/EDCP690	Research in Counseling Psychology I	3
PSYC/EDCP691	Research in Counseling Psychology II	3
PSYC/EDCP692	Assessment in Counseling Psychology I	3
PSYC/EDCP693		3
PSYC/EDCP695	Ethical and Professional Issues in Counseling Psychology	3
PSYC/EDCP697		3
PSYC/EDCP698	Advanced Didactic-Practicum in Counseling Psychology	3
PSYC/EDCP700	Theories and Strategies of Counseling Psychology	3

PSYC/EDCP799	Master's Thesis Research (at least six credits required)	6
PSYC/EDCP898	Pre-Candidacy Research (variable credits)	1-8
PSYC639	Internship in Professional Psychology	2-3
or EDCP889	Internship in Counseling and Personnel Services	
Dissertation Research Requirements		
PSYC/EDCP899	Doctoral Dissertation Research (after candidacy; 12 credits minimum)	12
Total Credits		77-89

Counseling Psychology (COCP)

Graduate Degree Program
College: Education

Abstract

The graduate programs in Counseling Psychology, School Psychology, and Counselor Education (CoPE) include several distinct areas of specialization that are designed to provide the knowledge and skills needed for practice and scholarship in counseling and related human service professions. These fields are concerned with assisting people individually, in groups, and in organizations to attain their optimal level of personal, social, educational, and career functioning. Graduates are employed in a variety of settings including schools, colleges and universities, mental health agencies, business and industry, government agencies, and other community service and practice facilities. Depending on the specific area of specialization and level of training, program graduates may serve as researchers, educators, supervisors, psychologists, counselors, or program administrators.

Master's level professional entry-level training is offered in the School Counseling program, which prepares students to become school counselors in elementary, middle, and high school settings. School counselors are leaders, advocates, and systemic change agents who provide individual and group counseling to school-aged children, develop and implement comprehensive developmental school counseling programs, and collaborate with all key stakeholders, including classroom teachers, school administrators, parents, and community members, to ensure the academic, personal-social, and college-career development of students.

The Ph.D. degree is offered in two areas of specialization:

- Counseling Psychology (in collaboration with the Psychology Department) and
- School Psychology.

Doctoral studies prepare students to achieve exceptional competence in the theory and practice of their field; to develop a high level of skills as researchers, educators and administrators; and to assume positions of leadership in relevant settings. Students in the specialization of Counseling Psychology are prepared to work as researchers, educators, psychologists, and supervisors in such settings as academic departments, college and university counseling centers, and community mental health agencies. Doctoral-level school psychologists serve as researchers, university faculty, supervisors, administrators, and advanced level practitioners. Program accreditation within CoPE includes: The School Psychology and Counseling Psychology doctoral programs are accredited by the American Psychological Association (APA). The School Psychology doctoral program is approved by the National Association of School Psychologists (NASP), and is also approved for certification by the Maryland State Department of Education. The School Counseling masters program is approved by the Maryland State Department of Education.

Note that, since 2012, the CoPE graduate programs have been part of a new department, the Department of Counseling, Higher Education, and Special Education. The CoPE programs were previously housed in the Department of Counseling and Personnel Services.

The **Counseling Psychology** (https://education.umd.edu/academics/departments/chse/cope) program at the University of Maryland is a joint program between the Department of Counseling and Personnel Services and the Department of Psychology. Our Counseling Psychology Program has been continuously accredited by the American Psychological Association since 1953. In ratings evaluating Counseling Psychology over the past three decades, the University of Maryland is always among the very top ranked programs in the United States. Our faculty represent a broad range of research interests, including psychotherapy process and outcome research, multicultural psychology, vocational psychology, and interpersonal relationships.

For more information please visit our site at http://www.counselingpsychology.umd.edu/counsel2.html

Financial Assistance

The Department of Counseling, Higher Education, and Special Education offers graduate research, teaching, and administrative assistantships on a selective basis to both masters and doctoral students. The Department also assists its students in finding assistantship placements with a variety of on-campus and off-campus units. In addition, a small number of new Ph.D. students are offered highly selective fellowships funded jointly by the Department and the University.

Contact

For additional information and application procedures, please visit our websites:

- http://www.education.umd.edu/CHSE/academics/specialization/
- http://www.education.umd.edu/CHSE
- www.education.umd.edu/CHSE/admissions/admission_criteria/CPFAQ.html

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College Park, MD 20742
Telephone: 301.405.8384
Fax: 301.405.9995
Email: chse-admissions@umd.edu

Website: http://www.education.umd.edu/CHSE/academics/specialization/CounselingPsychology.html

Courses: EDCP

Relationships: Counseling Psychology (COCP), Higher Education (HIED) (p. 236), International Education Policy (HIEP) (p. 261), School Counseling (COSC) (p. 366), School Psychology (COSP) (p. 368), Special Education (EDSP) (p. 382), Student Affairs (HISA) (p. 387)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationcocp.pdf)

Applicants for regular admission to master's degree programs must have an undergraduate GPA of at least B (3.0 on a 4.0 scale) and must submit their scores on the Graduate Record Examination. Applicants for admission to Ph.D. programs should check specific admissions criteria on the program's website. Applicants' undergraduate programs should ordinarily include at least 15 semester hours of coursework in behavioral science fields (e.g., anthropology, education, psychology, sociology, statistics). Selective screening of qualified applicants is necessary in order to limit enrollments to a size that guarantees high quality professional preparation and a close working, professional relationship between faculty and students.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	4 Dec

Other Deadlines: Please visit the program website at http://www.education.umd.edu/CHSE/academics/specialization/CounselingPsychology.html

Requirements

- Counseling Psychology, Doctor of Philosophy (Ph.D.) (p. 142)
- Counseling Psychology, Master of Arts (M.A.) (p. 142)

Facilities and Special Resources

All master's, A.G.S., and doctoral students are required to include supervised fieldwork experiences in their degree programs. The Counseling Psychology area of concentration has excellent cooperative relationships with on-campus facilities, such as the Counseling Center and Health Center. Fieldwork may also be done at a wide variety of school systems, colleges and universities, and counseling services and mental health agencies in the Baltimore/Washington metropolitan area, or nationally.

In addition to campus and program resources, students utilize the many major research and professional institutions that are easily accessible to the campus. These include the Library of Congress, the National Library of Medicine, the National Institutes of Health, the Institute of Education Sciences, professional associations such as the American Counseling Association, the American Psychological Association, and the National Association of School Psychologists.

Couple and Family Therapy, Master of Science (M.S.)

Non-Thesis only: 51 credits

Students must complete a total of 51 credits including three credits of FMSC789, three credits of FMSC799, and successfully pass the written and oral case presentation.

Supervised client contact begins in the student's first semester. Clinical students are required to gain 400 hours of face-to-face client contact, and 250 of these hours must be relational (with couples or families). The Center for Healthy Families, the couple and family therapy clinic operated by the Department, offers the opportunity to gain these hours. Clinical students receive 100 hours of supervision, both individual and group, for their client contact hours. Supervision in the Department's clinic is provided through a range of techniques including case discussion, one-way mirror observation, video review, co-therapy, and telephone consultation during live sessions. Students may choose to do some of their clinical work in a variety of available externship sites in the local area.

Course	Title	Credits
Core Requirements		
SPHL600	Foundations of Public Health	3
FMSC640	Family Therapy: Theory and Techniques	3
FMSC650	Ethical, Legal, and Professional Principles in Marriage and Family Therapy	3
FMSC658	Supervised Clinical Practice of Marriage and Family Therapy	9
FMSC610	Research Methods in Family Science	3
FMSC651	Psychopathology in the Family Context	3
FMSC745	Gender and Ethnicity in Family Therapy and Service Delivery	3
FMSC645	Sexuality: Issues in Family Therapy and Service Delivery	3

FMSC654	Clinical Marriage and Family Therapy Practice	3
FMSC641	Couples Therapy, Theory, and Techniques	3
FMSC642	Normal and Abnormal Individual and Family Development	3
FMSC652	Diagnosis and Treatment of Mental and Emotional Disorders in Family Systems	3
FMSC653	Advanced Application of MFT Models and Techniques	3
FMSC789	Non-Thesis Research	3
FMSC799	Master's Thesis Research	3
Total Credits		51

Couple and Family Therapy (FCFT)

Graduate Degree Program
College: Public Health

Abstract

The mission of the CFT Master's program is to prepare competent, effective therapists for clinical practice and advancement of the marriage and family therapy discipline. The program seeks to train professionals who demonstrate superior therapeutic skills, ethical integrity, intellectual curiosity, and a sincere commitment to working with families from diverse populations.

The M.S. in Couple and Family Therapy (CFT) provides students with the coursework and supervised clinical training typically required in states with Marriage and Family Therapy licensure. The program is accredited by the Commission on Accreditation for Marriage and Family Therapy Education of the American Association for Marriage and Family Therapy (AAMFT). The Couple and Family Therapy M.S. program require 48 credits for the non-thesis option and 51 credits for the thesis option. Completion of the program, which includes the 2-year internship, generally requires 2 years.

The Department of Family Science prepares students to describe, explain, and improve the quality of life through applied research, education, therapy, human services, policy analysis, and advocacy. The approach is interdisciplinary, emphasizing individual, interpersonal, and social change. The program of study is based on a system or ecological paradigm, combining the perspectives of interrelated professional fields of family science, maternal and child health, couple and family therapy, family policy, behavioral science, and human services. Graduates are prepared for careers in the public, non-profit and private sectors, including university teaching, research, family policy analysis, and administrative positions in human services and public health programs.

Financial Assistance

Graduate Assistantships are available to students admitted into the CFT program.

Contact

For additional information, please contact: Dr. Norman Epstein (CFT Program Director), or Dr. Kevin Roy (Graduate Director).

Department of Family Science
1142 School of Public Health Building
4200 Valley Drive
University of Maryland
College Park, MD 20742
Phone: 301.405.3672
Fax: 301.314.9161

Norman B. Epstein, Ph.D.
Program Director
Department of Family Science
1142 School of Public Health Building
4200 Valley Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4013
Fax: 301.314.9161
Email: nbe@umd.edu

Website: http://www.sph.umd.edu/fmsc

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Couple and Family Therapy, Master of Science (M.S.) (p. 144)

Facilities and Special Resources

Center is the training and research arm of the Couple and Family Therapy Program in the Department of Family Science. Departmental graduate students and faculty provide clinical and educational services to families from surrounding communities in this state-of-the-art facility. Master's and doctoral students use data collected at the Center for research projects.

The University's close proximity to the nation's capital, the state capital in Annapolis, federal executive departments, and headquarters of national

professional and public interest associations provide research and internship placements for studying family policy unmatched by any other graduate program in the discipline. The Washington-Baltimore metropolitan area offers rich opportunities for research on culturally and socioeconomically diverse families. The campus and department have excellent computer facilities. Students have ready access to the University's extensive library systems, as well as holdings from the Library of Congress, the National Institutes of Health, National Library of Medicine, National Archives, and many other library collections.

Creative Writing, Master of Fine Arts (M.F.A.)

Thesis option only: 36 credits

The M.F.A. degree program requires 36 credit hours of graduate work. The program balances courses in literature with writing workshops (30 hours), and requires a creative thesis (six hours). It offers concentrations in fiction and in poetry.

Course	Title	Credits
Core Requirements		
Poetry or Fiction concentration must complete the following:		
ENGL688	Poetry Workshop	12
Four English Literature Courses		12
Humanities elective		3
ENGL799	Master's Thesis Research	6
Concentration Options		
Select one of the following:		3
Poetry concentration:		
ENGL788	Studies in Poetic Form	
Fiction concentration:		
ENGL789	Form and Theory in Fiction	
Total Credits		36

Creative Writing (CRWR)

Graduate Degree Program
College: Arts and Humanities

Abstract

The MFA in Creative Writing provides a professional course of study for graduate students seeking to perfect their ability to compose poems, stories, and novels. While primarily affording students intensive studio or practical work within their chosen genre, the MFA in Creative Writing requires that students incorporate such work with a traditional study of literature. The goal of the MFA in Creative Writing is to provide an atmosphere in which students can both hone their skills as writers and gain a theoretical and historical understanding of their craft.

The Department of English also offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees in English Language and Literature (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?ENGL). Please visit the English Language and Literature (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?ENGL) listing for more information.

Financial Assistance

Each year, the program accepts 8 applicants (4 fiction writers and 4 poets), who are fully funded by Teaching Assistantships, and, this current admissions cycle, we were able to enhance all 8 Teaching Assistantships with additional fellowship support. Our aid packages are typically 2-year agreements. As Teaching Assistants, our MFA students teach one class during their first year (in the spring semester) and three classes during their second year. Although a great deal of this teaching is Academic Writing (English 101), our MFA students are guaranteed at least one chance to teach an undergraduate creative writing workshop or to serve as a teaching assistant in an undergraduate literature course.

Contact

Lindsay Bernal
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Creative Writing Program
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Universtiy of Maryland
College Park, MD 20742
Telephone: 301.405.3820
Email: lbernal@umd.edu

Michael Collier
Director
Creative Writing Program
Department of English
3103 Tawes Hall
7751 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3819
Email: collierm@umd.edu

Website: http://www.english.umd.edu/academics/creativewriting

Courses: ENGL

Relationships: English Language and Literature (ENGL) (p. 185)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume (optional)
- Writing Sample

In addition to fulfilling Graduate School requirements, applicants to the M.F.A. degree program should present a 3.0 GPA. Admission is for the Fall semester only. All application materials must be submitted electronically

through the Graduate School's Apply Yourself/Hobson's application system.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	3 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	3 Jan

Other Deadlines: Please visit the program website at http://www.english.umd.edu/academics/creativewriting

Requirements

- Creative Writing, Master of Fine Arts (M.F.A.) (p. 146)

Facilities and Special Resources

Resources for research in the College Park and Washington, D.C. area are unsurpassed. The university's libraries hold over 2,000,000 volumes. In addition to the outstanding holdings of the Library of Congress, the area also offers the specialized resources of the Folger Shakespeare Library, Dumbarton Oaks, the National Archives, the Smithsonian Institution, and the National Center for the Study of the Visual Arts. The university recently partnered with the Phillips Collection to create the University of Maryland Center for Art and Knowledge, a dynamic collaboration that includes new curriculum, experimental and community-focused education programs, a new Phillips Collection gallery and an open storage facility in College Park.

UMCP is a member of the Consortium of Institutions in the Washington area, which permits graduate students at College Park to enroll in courses at other universities for graduate credit at UMCP. Graduate students in English also may take courses for graduate credit at the Folger Institute of Renaissance and Eighteenth-Century Studies, which runs a series of seminars by distinguished scholars each year.

Criminology and Criminal Justice, Master of Arts (M.A.)

Non-thesis only: 30 credits required

Course	Title	Credits
Core Requirements		
CCJS600	Criminal Justice	3
CCJS604	Policy Analysis Project	3
CCJS605	Program Evaluation for Criminal Justice	3
CCJS611	Statistical Tools for Criminal Justice	3
CCJS651	Seminar in Criminology	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678D - International Law and Process)	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678E - Criminal Procedure Law)	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678F - Criminal Law)	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678G - Criminal Justice System in China)	3
CCJS720	Criminal Justice System Planning: Policy Analysis for Crime Control	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678K - Research Methods non credit)	0
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678L - Chinese Criminal Law and Criminal Justice non credit)	0
Total Credits		30

Criminology and Criminal Justice (CJCH)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

Students complete part of their coursework at the University of Maryland and part at Nanjing Normal University in China. Please visit the department website for more information.

Contact

Office of International and Executive Programs
1117L Chincoteague Hall
7401 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8443
Email: OIEP@umd.edu

Website: https://oiep.umd.edu/

Relationships: Criminology and Criminal Justice (CRIM) (p. 148), Justice Leadership (MPJL) (p. 269)

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- Notarized degree certificate
- Transcripts in English and Chinese

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please contact the department
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please contact the department

Other Deadlines: Please visit the program website at https://oiep.umd.edu/

Requirements

- Criminology and Criminal Justice, Master of Arts (M.A.) (p. 147)

Criminology and Criminal Justice, Master of Arts (M.A.)

Thesis only: 30 credits required

For the M.A. applicant, the undergraduate major must have included at least one course each in theory, statistics and research methods. The general plan of study for the Traditional M.A. is as follows: 30 semester hours of courses consisting of:

1. five required courses that must be passed with a 'B' or better (including two statistics courses);
2. six hours of thesis credit; and
3. three elective courses

Course	Title	Credits
Core Requirements		
CCJS600	Criminal Justice	3
CCJS610	Research Methods in Criminal Justice and Criminology	3
CCJS620	Fundamentals of Criminological Research	3
CCJS621	General Linear Models in Criminal Justice Research	3
CCJS651	Seminar in Criminology	3
CCJS799	Master's Thesis Research	6
Electives		9
Total Credits		30

Criminology and Criminal Justice, Doctor of Philosophy (Ph.D.)

Doctoral students who enter the program with a B.A. or B.S. must complete the master's requirements in addition to the doctoral level requirements. Students who enter with a M.S. or M.A. are required to complete only the doctoral level requirements.

Students whose highest degree is a BA/BS may choose to apply for entry either into the Traditional Masters program or directly into the Ph.D. program. Students admitted directly into the Ph.D. program will complete the requirements of the Traditional Masters program before beginning Ph.D.-level work.

In addition to the general Graduate School requirements, competence in research methodology and in quantitative techniques is expected for the completion of the Ph.D. degree, as well as competence in theory and the criminal justice field. The necessary coursework is determined on the basis of the student's previous preparation, needs and interests. The candidate is also required to pass a clinical assessment before advancing to candidacy.

Course	Title	Credits
Core Requirements		
CCJS699	Special Criminological Problems (Research Practicum)	3
CCJS654	History of Criminological Thought	3
CCJS700	Advanced Research Methods in Criminology and Criminal Justice	3
CCJS710	Advanced Statistics Methods - Limited Dependent Variables	3
CCJS720	Criminal Justice System Planning: Policy Analysis for Crime Control	3
Electives, one of which taken outside of department		15
Advanced Statistics course		3
Dissertation Requirements		
CCJS899	Doctoral Dissertation Research	12
Total Credits		45

Criminology and Criminal Justice (CRIM)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The program of graduate study leading to a Traditional Master of Arts and Doctorate of Philosophy degrees in the area of Criminology and Criminal Justice is intended to prepare students for research, teaching and professional employment in operational agencies within the field of criminal justice. This program combines an intensive background in a social science discipline such as criminology, criminal justice, sociology, psychology and public policy with graduate-level study of selected aspects of crime and criminal justice.

In addition, the Department offers a joint J.D./M.A. degree with the University of Maryland Francis King Carey School of Law, located in Baltimore.

A recent study of Department M.A. and Ph.D. alumni reveals that master's degree graduates have found employment in both public and private institutions in virtually every kind of activity associated with the criminal justice system: research; teaching; federal, state and local law enforcement; courts; corrections; private security; and funded programs. Ph.D. graduates have found employment mostly in teaching, research, and government agency administration.

Financial Assistance

Graduate research assistantships, teaching assistantships, scholarships, and fellowships are available to select individuals applying to our doctoral program. In recent years many admitted doctoral students receive funding through assistantships, and some may be awarded supplemental scholarships or fellowships offered by the Department, the BSOS Dean's Office, or The Graduate School. Applications should be received by December 1st of the preceding Fall term for best consideration.

Contact

Lauren Grant Campbell
Graduate Program Coordinator
Department of Criminology
2220 LeFrak Hall
7251 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6838
Fax: 301.405.4733
Email: criminologydept@umd.edu

Website: https://ccjs.umd.edu/landing/Graduate

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample

In addition to the general Graduate School rules, special admission requirements include a major in a social science discipline and nine hours of coursework in appropriate areas of criminal justice.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Preferred: 1 Dec / Final: 17 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Preferred: 1 Dec / Final: 17 Dec

Requirements

- Criminology and Criminal Justice, Doctor of Philosophy (Ph.D.) (p. 148)
- Criminology and Criminal Justice, Master of Arts (M.A.) (p. 148)

Facilities and Special Resources

The Department has various opportunities for graduate students to participate in current projects. Recent students have worked in research centers at the Maryland State Commission on Criminal Sentencing Policy, National Consortium for the Study of Terrorism and Responses to Terrorism (START), and the National Institute of Justice. In addition, our faculty maintain an array of ongoing, funded research projects where students can assist. These resources provide numerous opportunities for students to engage in policy development, research, and professional activities.

Critical Theory, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Core Requirements		
Introductory course in critical theory		3
Two certificate courses		6
Two theory courses		6
Colloquium in Critical Theory		3
Present theoretically-inflected work at a session of the theory colloquium		
Total Credits		18

Critical Theory (Z017)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The Graduate Certificate in Critical Theory is an integrated curriculum offering students the opportunity to gain advanced knowledge, expertise, and certification in the interdisciplinary and international field of critical theory. Students enrolled for the M.A. or Ph.D. degree within any department at the University of Maryland at College Park may apply to participate. The Certificate is presently administered through the Department of English and the Program Coordinator is Professor Christina Walter.

CONTACT

Christina Walter
Department of English
2119 Tawes Hall
7751 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7689
Email: cmwalter@umd.edu

Website: http://www.english.umd.edu

Admissions

Please contact Professor Christina Walter (cmwalter@umd.edu) for admissions information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.english.umd.edu

Requirements

- Critical Theory, Post-Baccalaureate Certificate (P.B.C.) (p. 149)

Cultural and Heritage Resource Management, Master of Professional Studies (M.P.S.)

Non-thesis only: 36 credits required

Cultural and Heritage Resource Management (MPCH)

abstract

The Master of Professional Studies in Cultural and Heritage Resource Management provides advanced training for those interested in working in the applied specializaiton of cultural resource management and heritage resource management. The coursework and training bridge the knowledge and experience gap between what is offered in a traditional academic course of study and the knowledge and skills required in cultural and heritage resource management. The program is built on a broad foundation including research methods, ethics, communication, management, technical writing, and critical thinking skills.

contact

Website: https://anth.umd.edu/

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose, including research interests
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (2)
- Graduate Record Examination (GRE) (optional)
- Writing Sample
- CV/Resume

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Best Consideration: 14 June	Program not accepting applications
	Final deadline: 26 July	
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Best Consideration: 14 June	Program not accepting applications
	Final deadline: 26 July	

Requirements

- Cultural and Heritage Resource Management, Master of Professional Studies (M.P.S.) (p. 150)

Cultural and Heritage Resource Management, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Core courses		12
Internship or Practicum		6
Total Credits		18

Cultural and Heritage Resource Management (Z121)

abstract

The Graduate Certificate in Cultural and Heritage Resource Management will emphasize professional development, ethics, and writing as well as professional communication, critical thinking, and career options.

contact

Website: https://anth.umd.edu/

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose, including research interests
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (2)
- Graduate Record Examination (GRE) (optional)
- Writing Sample
- CV/Resume

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Best Consideration: 14 June	Program not accepting applications
	Final deadline: 26 July	
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Best Consideration: 14 June	Program not accepting applications
	Final deadline: 26 July	

Requirements

- Cultural and Heritage Resource Management, Post-Baccalaureate Certificate (P.B.C.) (p. 150)

Curation and Management of Digital Assets, Post-Masters Certificate (P.M.C.)

12 credits required

The Curation and Management of Digital Assets (CMDA) Certificate is a post-master's program that focuses on instruction about and research into the creation, management, and use; the long-term preservation; and the current and future access to digital assets in a variety of disciplines and sectors of the economy. It is a four-course, fully online certificate designed for working professionals who need training in next-generation cloud computing technologies, tools, and resources to help them evaluate, select, and implement digital curation solutions.

The CMDA Certificate requires the completion of four courses, with a minimum 3.0 GPA. The following courses are taken in sequence within one calendar year.

Course	Title	Credits
Core Requirements		
INST640	Principles of Digital Curation	3
INST641	Policy and Ethics in Digital Curation	3
INST742	Implementing Digital Curation	3
INST744	Solving Problems in Digital Curation - Capstone Course	3
Total Credits		12

Curation and Management of Digital Assets (online) (Z093)

Graduate Certificate Program
College: Information Studies

Abstract

The Curation and Management of Digital Assets (CMDA) Certificate is a post-master's program that focuses on instruction about and research into the creation, management, and use of digital assets, and the long-term preservation and current and future access to those assets in a variety of disciplines and sectors of the economy. This four-course, fully online certificate designed for working professionals who need training in next-generation cloud computing technologies, tools, resources, and best practices to help them evaluate, select, and implement digital curation solutions.

In the Washington, D.C.-Maryland-Virginia region, across the nation, and around the world, the need for professionals to manage and curate digital assets is acute. Major corporations, government agencies, international organizations, universities, cultural heritage institutions, and scientific organizations need information professionals with the knowledge, skills, and abilities to manage, preserve, and curate digital resources.

Website: http://www.ischool.umd.edu

Contact

Student Services Office
College of Information Studies
4120 Hornbake Library, South Wing
4130 Campus Drive
College Park, MD 20742
Telephone: 301.405.2038
Fax: 301.405.9145
Email: ischooladmission@umd.edu

Courses: INST

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (1): Letter of recommendation needs to come from a supervisor or someone who can speak to the applicant's capacity for successfully completing the certificate program.
- CV/Resume
- Master's degree in library/information science; or Master's degree in related area/relevant experience

Application Submission Requirements for International Graduate Students

The University of Maryland is dedicated to maintaining a vibrant international graduate student community. The office of International Students and Scholars Services (ISSS) is a valuable resource of information and assistance for prospective and current international students. International applicants are encouraged to explore the services they offer and contact them with related questions. Please also visit

the Graduate Admissions Process for International applicants for more information.

Help with the Application

Those who have begun the application process are encouraged to contact the Hobson's helpdesk for any technical issues. Students who have not started the application process should direct questions related to the ApplyYourself application process to the Graduate School.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not accepting applications for Fall 2018	Not accepting applications for Fall 2018
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not accepting applications for Fall 2018	Not accepting applications for Fall 2018

Other Deadlines: Please visit the program website at http://www.ischool.umd.edu

Requirements

- Curation and Management of Digital Assets, Post-Masters Certificate (P.M.C.) (p. 151)

Facilities and Special Resources

The Digital Curation Innovation Center(DCIC) is a leader in research and education in digital curation. The Center fosters interdiciplinary partnerships in Big Records and archival analytics through public / industry / government partnerships. DCIC sponsors interdisciplinary projects that explore the integration of archival research data, user-contributed data, and technology to generate new forms of analysis and historical research. For more information, visit dcic.umd.edu.

Curriculum and Instruction, Master of Arts (M.A.)

Master's degree requirements vary according to the area of concentration and the type of degree. Typically, programs require 30 to 33 credit hours, which includes a core research requirement and possible comprehensive examination.

Beyond the successful completion of courses, students must demonstrate high standards of scholarship and the ability to engage in independent research. Students must either write and defend a research thesis, complete a seminar paper (non-thesis option) or a professional portfolio--requirement varies by specialization. Your faculty advisor will help you develop a program of study that is consistent with Departmental and University guidelines.

Students choose one of the following specializations:

english literacy education

Course	Title	Credits
EDCI685		3
TLPL***	(Investigating Policy, Pedagogy & Schooling)	3
Complete 15 credits of the following courses:		
EDCI640		3
EDCI673		3
EDCI740		3
EDCI745		3
EDCI840		3
Thesis or Non-thesis option		9
Thesis		
EDCI799	Master's Thesis Research	
Electives		
Non-thesis		
EDCI798	Special Problems in Teacher Education	
Electives		
Total Credits		30

Mathematics education

Course	Title	Credits
EDMS645	Quantitative Research Methods I	3
EDCI650		3
Discipline-based Content Studies		12
Mathematics courses		6
Thesis		
EDCI799	Master's Thesis Research	6
Total Credits		30

Minority and urban education

Course	Title	Credits
TLPL***	(Investigating Policy, Pedagogy & Schooling)	3
EDCI685		3
or EDMS645	Quantitative Research Methods I	
EDCI798	Special Problems in Teacher Education	3
Specialization courses		15
Electives		6
Total Credits		30

SCIENCE EDUCATION

Course	Title	Credits
TLPL***	(Investigating Policy, Pedagogy & Schooling)	3
EDCI670		3
EDCI770		3
EDCI685		3
EDCI688		3
Science or Math course		3
Specialization course		3
Electives		9
Total Credits		30

Curriculum and Instruction, Master of Education (M.Ed.)

Students have the option of pursuing certification or non-certification tracks.

Beyond the successful completion of courses, students must demonstrate high standards of scholarship and the ability to engage in independent research. Students must either write and defend a research thesis, complete a seminar paper (non-thesis option) or a professional portfolio--requirement varies by specialization. Your faculty advisor will help you develop a program of study that is consistent with Departmental and University guidelines.

Certification options

- Elementary: 36 credits required
- Middle School: 42 credits required
- Secondary English: 42 credits required
- Secondary Social Studies: 42 credits required
- Secondary Mathematics: 42 credits required
- Secondary Sciences: 42 credits required
- PreK-12 Art: 42 credits required
- PreK-12 World Languages: 42 credits required
- PreK-12 Teaching English to Speakers of Other Languages: 39 credits required
- PreK-12 Physical Education: 42 credits required
- PreK-12 Dance: 42 credits required
- Reading Education: 30 credits required
- World Languages: 42 credits required
- Creative Initiatives in Teacher Education: 37 credits required

non-certification options

All of the non-certification tracks require 30 credits.

- Art Education
- Arts Integration
- Elementary-Middle School
- English Literacy Education
- Mathematics Education
- Minority and Urban Education
- Reading Education
- Science Education
- Social Studies Education
- STEM Elementary
- World Languages Education
- TESOL Teacher Leadership

Curriculum and Instruction, Post-Baccalaureate Certificate (P.B.C.)

The Post-Baccalaureate Certificate in Literacy Coaching (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?Z038) is a six week program designed to prepare experienced, highly qualified middle and high school teachers to serve as literacy coaches in low performing middle and high schools. It is a joint program between the University of Maryland (UM)/Baltimore City Public Schools (BCPS City Schools)/Montgomery County Public Schools (MCPS)/Prince George's County Public Schools (PGCPS) serving cohorts of selected middle and high school teachers.

Curriculum and Instruction (EDCI)

Graduate Degree Program
College: Education

Abstract

The Department of Curriculum and Instruction (EDCI) merged with the Department of Education Policy Studies (EDPS) to form the Department of Teaching and Learning, Policy and Leadership (TLPL). For more detailed and up-to-date information about programs and resources see the TLPL website at http://education.umd.edu/TLPL.

The programs related to Curriculum and Instruction (EDCI) offer graduate study leading to the following degrees and certificates: Master of Arts (thesis and non-thesis), and Master of Education (M.Ed.). The Department offers a variety of programs individually designed to meet graduate students' personal and professional goals which may include educational research, teaching, supervising, providing leadership as curriculum specialists within the disciplines, teacher education or consulting at all levels of instruction: elementary, secondary and higher education.

Areas of concentration include art education (M.Ed. only), elementary/middle school education, history/social studies education, English education, Applied Linguistics and Language Education (ALLE) - world languages education and teaching English as a second language (TESOL), mathematics education, minority and urban education, teacher education/professional development (doctoral only), reading education, and science education. The Department also supports master's degree programs for candidates who have a bachelor's degree in fields other than education and wish to become certified teachers. (https://education.umd.edu/academics/departments/tlpl/prospective-students) In addition, there is a six-course Post-Baccalaureate Certificate in literacy coaching designed to prepare experienced, highly qualified middle and high school teachers to serve as literacy coaches in low performing middle and high schools.

NOTE: This section includes information about the M.A. and M.Ed. programs previously associated with the Department of Curriculum and Instruction; students interested in these programs should apply to EDCI, though TLPL now sponsors these programs. Students interested in the Department's new Ph.D. program should go to Education: Teaching and Learning, Policy and Leadership (TLPL) in the graduate catalog.

Financial Assistance

A variety of sources are available for seeking financial assistance in the way of graduate assistantships, scholarships, fellowships and financial aid loans. For more information visit http://www.education.umd.edu/TLPL/admissions/financiad.html .

Contact

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2311 Benjamin Building
3942 Campus Drive
College Park, MD 20742

Telephone: 301.405.3118
Fax: 301.314.9055
Email: tlpl-grad@umd.edu

Website: https://education.umd.edu/academics/departments/tlpl/prospective-students

Admissions

- M.A. admissions requirements (https://gradschool.umd.edu/education/edci-ma)
- M.Ed. admissions requirements (https://gradschool.umd.edu/education/edci-med)
- M.Ed. (with certification) admissions requirements (https://gradschool.umd.edu/education/edci-med-cert)

See the description of the EDCI programs and admissions overview on the TLPL website for more detailed information: http://www.education.umd.edu/TLPL/.

Admissions and Deadline Notes

Applications for the **TESOL and Minority and Urban Education (MUE) M.Ed. programs** are accepted for Fall only.

Summer admission is available for the **MCERT** program **ONLY**. For information about MCERT, please visit www.education.umd.edu/MCERT.

Applications for all other master's programs are accepted for the fall or spring.

Information related to our PhD program is now listed under Education: Teaching and Learning, Policy and Leadership (TLPL) (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?TLPL) **in the graduate catalog**

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	5 Mar	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	5 Feb	Please visit the program website

Other Deadlines: Please visit the program website at http://www.education.umd.edu/tlpl

Requirements

- Curriculum and Instruction, Master of Arts (M.A.) (p. 152)
- Curriculum and Instruction, Master of Education (M.Ed.) (p. 153)
- Curriculum and Instruction, Post-Baccalaureate Certificate (P.B.C.) (p. 153)

Facilities and Special Resources

Faculty and students in the department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including embassies and other international organizations, provide exceptional opportunities for internships and field experiences, research, and materials to enhance formal course experiences. Facilities that support graduate study include the Center for Mathematics Education, the Center for Science and Technology in Education, the Multicultural Research Center, and the Maryland Equity Project. Additional facilities in the College of Education include the Educational Technology Services Center and numerous Professional Development Schools in local school districts.

Curriculum and Instruction, Certificate of Advanced Study (C.A.S.)

This certificate is not currently accepting applications.

Curriculum and Instruction (Z902)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.education.umd.edu

Admissions

Please visit the program website.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Curriculum and Instruction, Certificate of Advanced Study (C.A.S.) (p. 154)

Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan

for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
Select four of the following:		12
ENPM686	Information Assurance	
ENPM691		
ENPM693	Network Security	
ENPM695	Secure Operating Systems	
ENPM694	Networks and Protocols	
ENPM685	Security Tools for Information Security	
Total Credits		12

Cybersecurity Engineering (online) (Z092)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered in collaboration with Department of Electrical and Computer Engineering, Department of Computer Science, and the Maryland Cybersecurity Center, our Cybersecurity Engineering degree programs merge engineering applications with computer science principles.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
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4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/cybersecurity.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admission

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 154)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Cybersecurity Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

The student must complete 30 credits of approved coursework with an average grade of B. The coursework, which allows up to 12 credits at the 400-level, must be approved by the program's departmental faculty advisor.

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required course:		3
ENPM691	(Programming in C for Cybersecurity Applications)	
Choose three of the following core courses:		9
ENPM685	Security Tools for Information Security	
ENPM686	Information Assurance	
ENPM693	Network Security	
ENPM694	Networks and Protocols	
ENPM695	Secure Operating Systems	
Choose at least two of the following electives:		6
ENPM687	Digital Forensics and Incidence Responses	
ENPM697	Secure Software Testing and Construction	
ENPM809	Special Topics in Engineering (ENPM809A - Applied Cryptography)	
ENPM809	Special Topics in Engineering (ENPM809I - Embedded Systems Hacking and Security)	
ENPM809	Special Topics in Engineering (ENPM809J - Cloud Security)	
ENPM809	Special Topics in Engineering (ENPM809K - Fundamentals for Artificial Intelligence and Deep Learning Framework)	
ENPM809	Special Topics in Engineering (ENPM809V - Bitcoin and Cryptocurrency Technologies)	
ENPM808	Advanced Topics in Engineering (ENPM808O - Intrusion Detection: From Theory to Practice)	
Choose up to four of the following electives:		12
ENPM611	Software Engineering	
ENPM631	TCP/IP Networking	
ENPM632	Advanced TCP/IP Networking	
ENPM696	Reverse Software Engineering	
ENPM808	Advanced Topics in Engineering (ENPM808L - Analytics for Decision Support)	
ENPM808	Advanced Topics in Engineering (ENPM808W - Data Science)	
ENPM809	Special Topics in Engineering (ENPM809G - Network Data Science)	
ENPM809	Special Topics in Engineering (ENPM809R - Software Defined Networking)	
Total Credits		30

Cybersecurity Engineering (PMCY)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered in collaboration with Department of Electrical and Computer Engineering, Department of Computer Science, and the Maryland Cybersecurity Center, our Cybersecurity Engineering degree programs merge engineering applications with computer science principles.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/cybersecurity.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Cybersecurity Engineering, Master of Engineering (M.Eng.) (p. 156)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County.

In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Cybersecurity (MECY) for more information.

Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
Select four of the following:		12
ENPM686	Information Assurance	
ENPM691		
ENPM693	Network Security	
ENPM695	Secure Operating Systems	
ENPM694	Networks and Protocols	
ENPM685	Security Tools for Information Security	
Total Credits		12

Cybersecurity Engineering (Z073)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered in collaboration with Department of Electrical and Computer Engineering, Department of Computer Science, and the Maryland Cybersecurity Center, our Cybersecurity Engineering degree programs merge engineering applications with computer science principles.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

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Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/cybersecurity

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 157)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Cybersecurity (Z092) for more information.

Cybersecurity Leadership, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Cybersecurity Leadership (Z077)

Graduate Certificate Program
College: Business

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.rhsmith.umd.edu

Admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Program not currently accepting applications
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Cybersecurity Leadership, Post-Baccalaureate Certificate (P.B.C.) (p. 158)

Cybersecurity, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

The student must complete 30 credits of approved coursework with an average grade of B. The coursework, which allows up to 12 credits at the 400-level, must be approved by the program's departmental faculty advisor.

Course	Title	Credits
Required course:		3
ENPM691	(Programming in C for Cybersecurity Applications)	
Choose three of the following core courses:		9
ENPM685	Security Tools for Information Security	
ENPM686	Information Assurance	
ENPM693	Network Security	
ENPM694	Networks and Protocols	
ENPM695	Secure Operating Systems	
Choose at least two of the following electives:		6
ENPM687	Digital Forensics and Incidence Responses	
ENPM697	Secure Software Testing and Construction	
ENPM809	Special Topics in Engineering (ENPM809A - Applied Cryptography)	
ENPM809	Special Topics in Engineering (ENPM809I - Embedded Systems Hacking and Security)	
ENPM809	Special Topics in Engineering (ENPM809J - Cloud Security)	
ENPM809	Special Topics in Engineering (ENPM809K - Fundamentals for Artificial Intelligence and Deep Learning Framework)	
ENPM809	Special Topics in Engineering (ENPM809V - Bitcoin and Cryptocurrency Technologies)	
ENPM808	Advanced Topics in Engineering (ENPM808O - Intrusion Detection: From Theory to Practice)	
Choose up to four of the following electives:		12
ENPM611	Software Engineering	
ENPM631	TCP/IP Networking	
ENPM632	Advanced TCP/IP Networking	
ENPM696	Reverse Software Engineering	
ENPM808	Advanced Topics in Engineering (ENPM808L - Analytics for Decision Support)	
ENPM808	Advanced Topics in Engineering (ENPM808W - Data Science)	
ENPM809	Special Topics in Engineering (ENPM809G - Network Data Science)	
ENPM809	Special Topics in Engineering (ENPM809R - Software Defined Networking)	
Total Credits		30

Cybersecurity (online) (MECY)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered in collaboration with Department of Electrical and Computer Engineering, Department of Computer Science, and the Maryland Cybersecurity Center, our Cybersecurity Engineering degree programs merge engineering applications with computer science principles.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. Tuition and fees are subject to change.

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/cybersecurity.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admission

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

• Cybersecurity, Master of Engineering (M.Eng.) (p. 159)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Dance, Master of Fine Arts (M.F.A.)

Thesis only: 60 credits required

Students enrolled in the program must complete a total of 60 credit hours of study with a minimum cumulative grade point average of 3.0 to graduate and will be assessed on a regular basis to determine their progress. Graduation from the program requires the successful completion of a final project demonstrating a synthesis of craft and artistic understanding as well as professional competence in the area of concentration. Final projects consist of:

1. the thesis project consisting of the public presentation of a body of dance works choreographed by the candidate, along with written documentation of the project as agreed upon with the thesis adviser;
2. the presentation of an online portfolio of selected indicators of artistry and pedagogy.

The thesis project work may be presented in one or more publicly attended events, in a shared capacity with another MFA candidate. Candidates are responsible for the organization of all production elements involved in the presentation of the project.

The following courses are required. Students should check with their advisor to determine the remainder of their coursework.

Course	Title	Credits
Core Requirements		
DANC600	Graduate Dance Research	3
DANC604	Graduate Studies in Dance Pedagogy	2
DANC608	Graduate Choreography I	3
DANC610	Workshop in the Direction of Dance Production	3
DANC611	Dance Technology and Media	3
DANC708	Choreography and Collaboration	3
DANC719	Graduate Choreography Projects	3
DANC784	Dance in a Global Context	3
DANC766	Graduate Movement Observation and Analysis	2
DANC777	Internship in Dance	6
DANC799	Master's Thesis Project	6
Electives approved with advisor		23
Total Credits		60

Dance (DANC)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Theatre, Dance, and Performance Studies offers a Master of Fine Arts degree in Dance, encompassing choreography, performance, dance and technology, scholarly research, and pedagogy. Emphasizing creative work and collaboration with TDPS MFA candidates in Lighting,

Set, Costume and Media/Projection Design, the program is grounded in rigorous academic study and offers a transformational education to those who are curious, motivated, self-directed and possess a spirit of expansive inquiry and innovation. The program is designed to give outstanding students advanced training, experience in teaching, and opportunities for creative growth. For more information visit the MFA in Dance website at http://tdps.umd.edu/programs/mfa-dance or the School website at http://tdps.umd.edu.

Aimed primarily at modern or contemporary dancers with a high skill level and background in creating and performing at a professional level, opportunities abound in the creation of cross-disciplinary projects, presenting choreography in formal and informal settings throughout the three years, performing in guest artist and faculty works, presenting academic work at conferences and symposia, and participating in community-based performance and scholarly events.

The degree culminates with a thesis: an original choreographed and performed creative project and a written thesis. The third year also includes an off-campus internship with a professional arts organization, research venue, agency, company, or school.

The competencies that students learn during the program will allow them to teach a broad range of dance and dance-related subjects after they graduate. They will be able to produce and present dance in a number of contexts and modalities, on campus, in professional and site-specific venues, and in the community.

We wish our graduates to exhibit a high degree of insight into the cultural contexts in which dance has developed in the past and continues to develop today.
Students are expected to spend a significant amount of time learning about technical aspects of dance as well as promotion and house management and the myriad of other organizational details that go into producing a dance performance. They will be actively involved in the practical application of this knowledge as part of their training.

The program is highly selective (four students per year) and auditions are required. The MFA is a full-time three-year program. Financial support is available for each student selected.

Financial Assistance

Four candidates are admitted each Fall, and each of the four are offered financial support through teaching assistantship appointments, or if available, fellowships. Assistantships are never guaranteed and funding can change year to year. All qualified applicants may be nominated for Graduate School fellowships; the deadline for all applications is posted on the TPDS website annually. For more information, visit http://tdps.umd.edu or call 301-405-6694.

Contact

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School of Theatre, Dance, and Performance Studies
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Crystal Gaston
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Website: http://tdps.umd.edu/programs/mfa-dance

Keywords: Competency-based degree with emphasis on developing highly skilled teaching artists with concentrations in either performance or choreography. Option to receive Certification in Laban Movement Studies.

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Sample of Work: A 10-15 minute video, providing example of applicant's choreography with a description to include name of the work, performers and other choreographers, either on the applicant's professional website or through a Vimeo/YouTube link entered into the Multimedia Requirements section of the application

Applicants should have a strong undergraduate preparation in technique and dance composition. They should have completed the following undergraduate courses or their equivalent: improvisation, kinesiology, dance teaching methods, dance production, Laban Movement Analysis, and two semesters of dance history or one semester of history and one of dance philosophy, ethnology or aesthetics. Undergraduate deficiencies will be considered on an individual basis.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	25 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	25 Jan

Other Deadlines: Please visit the program website at http://tdps.umd.edu/programs/mfa-dance

Requirements

- Dance, Master of Fine Arts (M.F.A.) (p. 160)

Facilities and Special Resources

The location of the campus, eight miles away from Washington D.C., places the School a half hour away from America's arts district where one may study and enjoy a wide variety of offerings of ballet, modern and world dance. Washington D.C. is also a center for policy and participation in the public discourse about the arts.

Data Science, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Core Requirements		
CMSC641	Principles of Data Science	3
CMSC642	Big Data Systems	3
CMSC643	Machine Learning and Data Mining	3
CMSC644	Algorithms for Data Science	3
Total Credits		12

Data Science (Z104)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Abstract

Data Science is an emerging field encapsulating interdisciplinary activities used to create data-centric products, applications or programs that address specific scientific, socio-political, or business questions. Data Science is also commonly referred to as big data analytics, predictive analytics, advanced analytics, etc. It is making deep inroads in industry, government, health, and journalism, and many other disciplines. The Harvard Business Review has called "Data scientist" the "sexiest job of the 21st century", and due to the growing need for data science, there is a significant shortage of trained data scientists.

Offered by the nationally ranked Department of Computer Science (https://www.cs.umd.edu), the University of Maryland's **Graduate Certificate of Professional Studies in Data Science**, provides a broad introduction to the field of Data Science, including how to extract and clean data, how to store and manage large volumes of data, and how to analyze such data and extract insights from it. Data Science requires the ability to integrate data, operate on data at scale, analyze data, make predictions, find patterns and form and test hypothesis. It incorporates practices from a variety of fields in computer science, chiefly Machine Learning, Statistics, Databases, and Visualization.

Financial Assistance

See: http://oes.umd.edu/professional-programs/data-science/data-fees-aid for information about fees, payment plans, and financial aid.

Contact

Amol Deshpande
Professor
3221 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.539.9422
Email: amol@cs.umd.edu

Website: http://ter.ps/datascience

Courses: CMSC

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students) (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements)

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Prior Coursework: Prior coursework establishing quantitative ability (i.e. calculus, linear algebra, basic statistics etc.)
- Proficiency in programming languages: Proficiency in programming languages, demonstrated either through prior programming coursework or substantial software development experience.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Prior coursework establishing quantitative ability (i.e. calculus, linear algebra, basic statistics etc.), and proficiency in programming languages, demonstrated either through prior programming coursework or substantial software development experience, is required.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	26 July
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	N/A

Other Deadlines: Please visit the program website at http://ter.ps/datascience

Requirements

- Data Science, Post-Baccalaureate Certificate (P.B.C.) (p. 162)

Digital Studies, Post-Baccalaureate Certificate (P.B.C.)

15 credits required

Course	Title	Credits
Core Requirements		
MITH610	Introduction to Digital Studies in the Arts and Humanities	3
Praxis course approved with advisor		3
MITH729	Colloquium in Digital Studies	3
Electives approved with advisor		6
Total Credits		15

Digital Studies (Z110)

Graduate Certificate Program
College: Arts and Humanities

Abstract

Digital Studies in the Arts and Humanities (DSAH) is an interdisciplinary Graduate Certificate at the University of Maryland.

It offers graduate students a chance to combine the critical study of new forms of digital media and identity with creative and analytical practices utilizing digital media as well as the application of computational tools and techniques to traditional areas of humanistic study. While it is often hands-on or applied, Digital Studies also encourages—indeed demands—work that is primarily critical, theoretical, or experimental in nature.

Broadly speaking then, Digital Studies is a critical, scholarly, and creative response to the widespread influence of digital media across nearly every aspect of contemporary life; more specifically, it recognizes that teaching, research, and scholarship in the arts and humanities cannot remain isolated from the networks, platforms, and new media all around us. Scholars and practitioners of the arts and humanities should play an active critical and creative role in shaping both reception and development of digital media, both in our disciplines and in society at large.

Contact

Matthew Kirschenbaum
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Website: http://dsah.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

Application for admission to the Certificate is currently available on a rolling basis to any matriculated graduate student in the College of Arts and Humanities (http://www.arhu.umd.edu) (ARHU) at the University of Maryland's College Park campus.

Admission is selective, and will be offered at the discretion of the program Director and the Advisory Board (http://dsah.umd.edu/people). Considerations in admissions decisions will include the student's current academic standing, the extent to which students can demonstrate that their research or professional plans are compatible with the goals and objectives of the program, and—vitally—diversity.

We regret that we cannot offer admission to candidates who are not currently graduate students already enrolled in an ARHU department or program on the College Park campus, though enrollment in the Colloquium or other individual courses may be possible subject to instructor approval.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://dsah.umd.edu

Requirements

- Digital Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 163)

Ecological Economics, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Ecological Economics (Z009)

Graduate Certificate Program
College: Behavioral and Social Sciences

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.econ.umd.edu

Admissions
Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.econ.umd.edu

Requirements

- Ecological Economics, Post-Baccalaureate Certificate (P.B.C.) (p. 163)

Economic Analysis, Post-Baccalaureate Certificate (P.B.C.)

The Graduate Certificate in Economic Analysis (Z074) is awarded to students who have successfully completed the five core courses of the MPEC program.

Course	Title	Credits
Core Requirements		
ECON641	Microeconomic Analysis	3
ECON642	Topics in Applied Macroeconomics	3
ECON643	Empirical Analysis I: Foundations of Empirical Research	3
ECON644	Empirical Analysis II: Introduction to Economic Models	3
ECON645	Empirical Analysis III: Econometric Modeling and Forecasting	3
Total Credits		15

Economic Analysis (off-campus) (Z074)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The off-campus Graduate Certificate in Economic Analysis (Z074) is conferred to students who graduate after successfully completing the 5 core courses of the off-campus Master of Professional Studies in Applied Economics program (MPEC). Classes meet weeknights in Washington, DC.

The Z074 Graduate Certificate requirements are identical to those of the Z098 Graduate Certificate, but the Z098 certificate is conferred to students who graduate after successfully completing the 5 core courses of the on-campus MPEM program.

Financial Assistance

The economics department does not offer fellowships or graduate assistantships to any of the students in the Z074 Graduate Certificate program. To be eligible to receive any type of Federal Student Financial Aid, the student must:

1. be a U.S. citizen, U.S. Permanent Resident, or other eligible non-citizen
2. register with the Selective Service Administration (unless exempt). Students are exempt if they are female, under 18, born before 1960, on active duty in the U.S. Armed Forces, citizens of the Federated State of Micronesia or The Marshall Islands, or permanent residents of the Trust territory of the Pacific Islands (Palau).
3. enroll at a college or university that participates in the Federal Student Financial Aid Programs. These programs include the Federal Pell Grants (Pell Grants), Federal Supplemental Educational Opportunity Grants (FSEOG), Federal Subsidized and Unsubsidized Direct Loans, Federal Perkins Loans, and Federal Work-Study (FWS).
4. be working toward a degree or certificate.
5. be making Satisfactory Academic Progress.
6. not owe a refund on any federal grant, must not have borrowed federal student loans in excess of annual or aggregate loan limits, and must not be in default on any federal student loan unless satisfactory payment arrangements have been made.

Some of our students also have their tuition paid, at least in part, by an employer or other 3rd parties.

The University's Financial Services Center provides Third Party Billing when the third party requires a bill from the university. More information about financial aid is available from the University of Maryland's Office of Student Financial Aid.

Contact

John Straub, PhD
Executive Director of Master's in Applied Economics Program
1400 16th Street, NW
Suite 140
Washington, DC 20036
Telephone: 202.525.4308
Email: DCmasters@econ.umd.edu

Website: http://masters.econ.umd.edu

Courses: ECON

Relationships: Applied Economics (off-campus) (MPEC) (p. 43), Applied Economics (on-campus) (MPEM) (p. 44), Economic Analysis (on-campus) (Z098) (p. 165)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- CV/Resume
- Introductory Macroeconomics course (grade of B or higher)
- Introductory Microeconomics course (grade of B or higher)
- Calculus (grade of B- or higher)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Jun	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jun	14 Dec

Other Deadlines: Please visit the program website at http://masters.econ.umd.edu

Requirements

- Economic Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 164)

Facilities and Special Resources

Classes meet at 1400 16th Street, NW, suite 140 in Washington, DC.

Economic Analysis, Post-Baccalaureate Certificate (P.B.C.)

The Graduate Certificate in Economic Analysis (Z098) is awarded to students who have successfully completed the five core courses of the MPEM program.

Course	Title	Credits
Core Requirements		
ECON641	Microeconomic Analysis	3
ECON642	Topics in Applied Macroeconomics	3
ECON643	Empirical Analysis I: Foundations of Empirical Research	3
ECON644	Empirical Analysis II: Introduction to Economic Models	3
ECON645	Empirical Analysis III: Econometric Modeling and Forecasting	3
Total Credits		15

Economic Analysis (on-campus) (Z098)

Graduate Certificate Program

College: Behavioral and Social Sciences

Abstract

The on-campus Graduate Certificate in Economic Analysis (Z098) is conferred to students who graduate after successfully completing the 5 core courses of the on-campus Master of Professional Studies in Applied Economics program (MPEM). Classes meet weeknights on campus in College Park.

The Z098 Graduate Certificate requirements are identical to those of the Z074 Graduate Certificate, but the Z074 certificate is conferred to students who graduate after successfully completing the 5 core courses of the off-campus MPEC program.

Financial Assistance

The economics department does not offer fellowships or graduate assistantships to any of the students in the Z074 Graduate Certificate program. To be eligible to receive any type of Federal Student Financial Aid, the student must:

1. be a U.S. citizen, U.S. Permanent Resident, or other eligible non-citizen
2. register with the Selective Service Administration (unless exempt). Students are exempt if they are female, under 18, born before 1960, on active duty in the U.S. Armed Forces, citizens of the Federated State of Micronesia or The Marshall Islands, or permanent residents of the Trust territory of the Pacific Islands (Palau).
3. enroll at a college or university that participates in the Federal Student Financial Aid Programs. These programs include the Federal Pell Grants (Pell Grants), Federal Supplemental Educational Opportunity Grants (FSEOG), Federal Subsidized and Unsubsidized Direct Loans, Federal Perkins Loans, and Federal Work-Study (FWS).
4. be working toward a degree or certificate.
5. be making Satisfactory Academic Progress.
6. not owe a refund on any federal grant, must not have borrowed federal student loans in excess of annual or aggregate loan limits, and must not be in default on any federal student loan unless satisfactory payment arrangements have been made.

Some of our students also have their tuition paid, at least in part, by an employer or other 3rd parties. The University's Financial Services Center provides Third Party Billing when the third party requires a bill from the university. More information about financial aid is available from the University of Maryland's Office of Student Financial Aid.

Contact

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Website: http://masters.econ.umd.edu

Courses: ECON

Relationships: Applied Economics (off-campus) (MPEC) (p. 43), Applied Economics (on-campus) (MPEM) (p. 44), Economic Analysis (off-campus) (Z074) (p. 164)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- CV/Resume
- Introductory Macroeconomics course (grade of B or higher)
- Introductory Microeconomics course (grade of B or higher)
- Calculus (grade of B- or higher)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Only fall admission is possible. The application deadline is June 15th. (Spring admission is possible to the off-campus Z074 certificate program.)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jun
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	N/A

Other Deadlines: Please visit the program website at http://masters.econ.umd.edu

Requirements

- Economic Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 165)

Facilities and Special Resources

Classes meet weeknights on campus in College Park.

Economics, Master of Arts (M.A.)

Our department offers admission only to students interested in earning a Ph.D. Our program is not designed for students who are interested only in a Master's degree. However, our Ph.D. students may obtain an M.A. degree during their program, either as a terminal degree for students leaving the Ph.D. program, or as an intermediate sign of achievement for students who are continuing in the Ph.D. program. For students who are interested in applied economics, but are not pursuing a Ph.D., the University of Maryland offers a professional masters in applied economics. This program is designed for working professionals; it is not appropriate for a Ph.D. in economics. Contact masters@econ.umd.edu or visit http://masters.econ.umd.edu for more information.

Economics, Doctor of Philosophy (Ph.D.)

The Department of Economics at the University of Maryland prepares graduate students for careers in teaching, research, and government service. The course of study provides a solid foundation in economic theory, econometrics and applied fields. The Ph.D. program requires:

1. written examinations in microeconomic and macroeconomic theory, taken during the summer after the first year of study,
2. completion of a three-course sequence and a written examination or field paper in a major field,
3. completion of a two-course sequence in a minor field,
4. completion of an econometrics sequence,
5. an additional supporting course in a theoretical or applied field, and
6. a dissertation.

In the third year, students begin directed research by participating in workshops appropriate to their dissertation research.

Course	Title	Credits
Core Requirements		
ECON623	Econometrics I	3
ECON624	Econometrics II	3
Select two of the following workshops, each in a different semester:		4
ECON808	Workshop on Macroeconomics, International Macroeconomics and International Finance	
ECON828	Workshop in Econometrics	
ECON848	Workshop in International Trade, Institutional Economics and Political Economy	
ECON868	Workshop in Industrial Organization, Microeconomic Theory and Behavioral and Experimental Economics	
ECON878	Workshop in Development, Labor and Public Economics	
Select three courses in a major field* [1]		6
Select two courses in a minor field* [1]		4
Select a supporting course at the 600-level or above* [2]		2
Dissertation Research Requirement		
ECON899	Doctoral Dissertation Research	12
Total Credits		34

[1] Average grade of B+ or better

[2] Grade of B- or better

* Credits may vary

Economics (ECON)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Economics Program offers graduate study leading to the Doctor of Philosophy degree. During the course of study toward the Ph.D., doctoral

students also have the opportunity to obtain a Master of Arts degree. Areas of specialization include: Advanced Macroeconomics, Advanced Microeconomics, Behavioral and Experimental Economics, Comparative Institutional Economics, Econometrics, Economic Development, Economic History, Environmental and Natural Resource Economics, Industrial Organization, International Finance and Macroeconomics, International Trade, Labor Economics, Political Economy, and Public Economics.

Financial Assistance

Many students entering our graduate program receive financial aid. Some students receive graduate assistantships, requiring about 15 hours of teaching or research service per week. Graduate assistantships provide a stipend and a very attractive package of fringe benefits that include medical insurance and full tuition remission. Other students receive first-year fellowships. These fellowships also include a stipend, medical insurance and tuition remission, but do not require students to work as a teaching or research assistant. In most cases, fellowships convert to assistantships beginning in the second year. Students who enter our program with financial aid are guaranteed financial aid for two years in all cases, and for five years conditional on satisfactory progress in the program.

Contact

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Fax: 301.405.3542
Email: Fletcher@econ.umd.edu

Website: http://www.econ.umd.edu/landing/Graduate

Courses: ECON

Admissions
General Requirements

- Statement of Purpose
- Transcript(s): Transcripts from all institutions attended after high school or secondary school whether or not a degree was received. Fall term transcripts need to be included for anyone still attending an institution.
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationecon.pdf)
- Description of Research/Work Experience (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umddescriptionofresearchworkexperienceecon.pdf)

By the application deadline, applicants should have completed advanced undergraduate courses in microeconomics, macroeconomics, and econometrics. Applicants are also expected to have completed the equivalent of three semesters of calculus, a semester of linear algebra, and a semester of differential equations. The majority of admitted students have also completed course work in real analysis or other upper-level mathematics. The Graduate Record Examination (GRE) Aptitude test is required. Submitted GRE scores must be valid through January 5, 2018. All of the Department's graduate students are full-time students.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.econ.umd.edu/landing/Graduate

Requirements

- Economics, Doctor of Philosophy (Ph.D.) (p. 166)
- Economics, Master of Arts (M.A.) (p. 166)

Ecosystems Restoration, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Ecosystems Restoration (Z041)

Graduate Certificate Program
College: Agriculture and Natural Resources

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.oes.umd.edu

Admissions
Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Program not currently accepting applications	Program not currently accepting applications
International Applicants		

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oes.umd.edu

Requirements

- Ecosystems Restoration, Post-Baccalaureate Certificate (P.B.C.) (p. 167)

Electrical and Computer Engineering, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

The M.S. program offers the thesis and non-thesis options. Students must satisfy a course requirement and complete either a thesis or scholarly paper. For complete details, see the ECE Graduate Handbook (http://www.ece.umd.edu/handbook).

THESIS OPTION

Course	Title	Credits
Select three ENEE core courses		9
Remainder of coursework [1]		15
ENEE799	Master's Thesis Research	6
Total Credits		30

1. Additional ENEE & approved non-ENEE courses are accepted- must be at the 600-level or above but cannot include: ENEE 698, 699, 799, 898, 899

non-thesis option

Course	Title	Credits
Select four ENEE core courses		12
Remainder of coursework [1]		18
Complete a scholarly paper		
Total Credits		30

1. Additional ENEE & approved non-ENEE courses are accepted- must be at the 600-level or above but cannot include: ENEE 698, 699, 799, 898, 899

Electrical and Computer Engineering, Doctor of Philosophy (Ph.D.)

Students in the Ph.D. program must complete a course requirement, satisfy a Ph.D. qualifying requirement, pass an oral Ph.D. research proposal examination, and write and successfully defend a Ph.D. dissertation. For complete details, see the ECE Graduate Handbook (http://www.ece.umd.edu/handbook).

Course	Title	Credits
Graduate Technical courses [1]		18
ENEE698	Graduate Seminar	3
Two approved non-ENEE lecture courses		6
Remainder of coursework [2]		9
Doctoral Dissertation Research Requirement		
ENEE899	Doctoral Dissertation Research	12
Total Credits		48

1. Complete six ENEE lecture courses. These courses must be at the 600 level or above, not including ENEE698, ENEE699, ENEE799, ENEE898, and ENEE899.
2. A maximum of six credits of ENEE699 and ENEE799 combined may be included.

Electrical and Computer Engineering (ENEE)

Graduate Degree Program
College: Engineering

Abstract

The Department of Electrical and Computer Engineering (ECE) at the University of Maryland, College Park offers one of the strongest and most highly-ranked programs in the nation. Led by 89 full-time and affiliate faculty members and 50 research faculty and postdocs, the research programs of the department cover a wide spectrum of activities in the areas of:

- Communications and Networking
- Signal Processing
- Control, Robotics, and Dynamical Systems
- Computer Engineering
- Optics and Photonics
- Circuits and Systems
- Electronic Materials and Devices
- Bioelectronics and Systems
- Applied Electromagnetics

Our close affiliation with a number of research institutes such as the Institute for Systems Research, the Institute for Advanced Computer Studies, the Institute for Research in Electronics and Applied Physics, the Institute for Physical Science and Technology, and the Maryland Center for Integrated Nano Science and Engineering provides to our students and researchers the opportunity for team-oriented, cross-disciplinary research and access to the institutes' state-of-the-art laboratories.

ECE is a large department that offers a broad range of programs and research opportunities. Its research innovations are aimed at helping government and industry face today's most difficult global challenges. Employers and peer institutions recognize the prestige of Maryland's engineering programs.

Maryland's proximity to Washington, DC, offers unique research opportunities with national and government laboratories such as NASA's Goddard Space Flight Center, the National Institutes of Health, the National Institute of Standards and Technology, and the Army and Navy Research Labs. No other top Engineering program in the U.S. can provide such close proximity and access to national laboratories, federal government, and the Department of Defense.

The Department of Electrical and Computer Engineering offers graduate study leading to the Master of Science and Doctor of Philosophy degrees.

For additional information about the department's programs and research, please visit ece.umd.edu.

Financial Assistance

Financial aid is available to graduate students in the form of research assistantships, teaching assistantships, and fellowships. Details are available in the ECE Graduate Handbook (http://www.ece.umd.edu/handbook). Applicants for admission are automatically considered for these packages provided they mark "yes" for financial assistance on the application form and submit their materials by the preferred deadline.

Contact

Graduate Studies Office
Department of Electrical and Computer Engineering
2434 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3681
Fax: 301.405.8728
Email: ecegradstudies@umd.edu

Website: http://www.ece.umd.edu

Courses: ENEE

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations (optional)

For the most current and detailed information regarding ECE graduate admissions and deadlines, please refer to our ECE Graduate Admissions (http://www.ece.umd.edu/grad/admissions) web page. Applicants must follow all instructions detailed on this web page.

For admission to the graduate programs in electrical and computer engineering, students must hold an undergraduate degree in electrical or computer engineering or related field (math, computer science, physics, or other areas of engineering) and have an overall grade point average of B+ or better. In exceptional cases, students with a lower GPA may also be admitted. Other criteria include overall academic record, strength of recommendations, GRE score, and adequacy of preparation. Applicants are competitively judged by a faculty committee.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Priority: 16 Dec / Final: 15 May
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Priority: 16 Dec / Final: 15 Mar

Other Deadlines: Please visit the program website at http://www.ece.umd.edu

Requirements

- Electrical and Computer Engineering, Doctor of Philosophy (Ph.D.) (p. 168)
- Electrical and Computer Engineering, Master of Science (M.S.) (p. 168)

Facilities and Special Resources

For detailed information on the department's research institutes and laboratories, please see the ECE Research Overview.

Electrical and Computer Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

The student chooses an area of concentration offered by an engineering department and completes 30 credit hours of approved coursework with an average grade of B. The coursework, which allows up to 12 credits at the 400-level, must be approved by the program's departmental faculty advisor.

Students complete six core courses and four electives. All electives must be approved by the student's advisor. Two available focus areas include Computer Engineering (1) and Communication and Signal Processing (2).

Computer Engineering

Course	Title	Credits
Core Requirements		
Students can take all six of the following core courses or five of these core courses and one from the Communication and Signal Processing area or the Software Engineering academic option.		
ENEE645	Compilers and Optimization	3
ENPM607	Computer System Design and Architecture	3
ENPM609	Microprocessor-Based Design	3
ENPM610	Digital VLSI Design	3
ENPM615	Embedded Systems	3
ENPM675	Operating System Design	3

Select four electives	12
Total Credits	30

Communication and Signal Processing

Course	Title	Credits
Core Requirements		
Students can take all six courses from this area, or a minimum of four courses from this area and up to two courses from either Computer or Software Engineering.		
ENPM600	Probability and Stochastic Processes for Engineers	3
ENPM601	Analog and Digital Communication Systems	3
ENPM602	Data Networks	3
ENPM603	Theory and Applications of Digital Signal Processing	3
ENPM604		3
ENPM605		3
Select four electives		12
Total Credits		30

Electrical and Computer Engineering (PMEE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered by the Department of Electrical and Computer Engineering, our Master of Engineering program in electrical and computer engineering boasts a unique connection with prestigious institutes, advanced laboratories, and leading faculty. Students also benefit from a team-oriented, multidisciplinary program that helps strengthen professional networks and provides knowledge and experience in areas of communications and networking, signal processing control, computer engineering, and more. Students in this program choose from 1 of 2 tracks: Computer Engineering or Communications and Signal Processing.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. Tuition and fees are subject to change.

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Coordinator for Admission and Recruitment
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2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/electrical-computer.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Electrical and Computer Engineering, Master of Engineering (M.Eng.) (p. 169)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Electrical and Computer Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Students select either the Communication and Signal Processing sequence or the Computer Engineering sequence:

Computer Engineering

Course	Title	Credits
Required courses:		
ENPM607	Computer System Design and Architecture	3
ENPM609	Microprocessor-Based Design	3
ENPM610	Digital VLSI Design	3
Select one of the following:		3
ENPM611	Software Engineering	
ENPM675	Operating System Design	
ENPM676	VLSI Testing and Design for Testability	
Total Credits		12

Communication and Signal Processing

Course	Title	Credits
Required Courses:		
ENPM600	Probability and Stochastic Processes for Engineers	3
ENPM601	Analog and Digital Communication Systems	3
Select two of the following:		6
ENPM602	Data Networks	
ENPM603	Theory and Applications of Digital Signal Processing	
ENPM604		
ENPM605		
Total Credits		12

Electrical and Computer Engineering (Z057)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered by the Department of Electrical and Computer Engineering, our Master of Engineering program in electrical and computer engineering boasts a unique connection with prestigious institutes, advanced laboratories, and leading faculty. Students also benefit from a team-oriented, multidisciplinary program that helps strengthen professional networks and provides knowledge and experience in areas of communications and networking, signal processing control, computer engineering, and more. Students in this program choose from 1 of 2 tracks: Computer Engineering or Communications and Signal Processing.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
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4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/electrical-computer

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Electrical and Computer Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 171)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENME690	Mechanical Fundamentals of Electronic Systems	3
ENME695	Design for Reliability	3
Select two of the following:		6
ENME737	Prognostics and Health Management	
ENME770	Life Cycle Cost and System Sustainment Analysis	
ENME780	Mechanical Design of High Temperature and High Power Electronics	
ENRE600	Fundamentals of Failure Mechanisms	
ENRE602	Reliability Analysis	
ENRE641	Probabilistic Physics of Failure and Accelerated Testing	
Total Credits		12

Electronic Packaging (online) (Z111)

Graduate Certificate Program
College: Engineering

Abstract

Our electronic packaging Graduate Certificate in Engineering leverages the university's unique strength in reliability along with its expertise in electrical engineering, mechanical engineering, materials science, and business to empower students to further careers in areas such as avionics, automotive electronics, industrial motor drives, military

electronics, and medical equipment. Course topics include basics of electronic system integration, heat transfer, thermal management, stress analysis, cost analysis, quality and reliability assessment, and prognostics and health management.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/electronic-packaging.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://advancedengineering.umd.edu

Requirements

- Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.) (p. 172)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
ENME690	Mechanical Fundamentals of Electronic Systems	3
ENME695	Design for Reliability	3
Select two of the following:		6
ENME737	Prognostics and Health Management	

ENME770	Life Cycle Cost and System Sustainment Analysis
ENME780	Mechanical Design of High Temperature and High Power Electronics
ENRE600	Fundamentals of Failure Mechanisms
ENRE602	Reliability Analysis
ENRE641	Probabilistic Physics of Failure and Accelerated Testing
Total Credits	12

Electronic Packaging (Z112)

Graduate Certificate Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our electronic packaging Graduate Certificate in Engineering leverages the university's unique strength in reliability along with its expertise in electrical engineering, mechanical engineering, materials science, and business to empower students to further careers in areas such as avionics, automotive electronics, industrial motor drives, military electronics, and medical equipment. Course topics include basics of electronic system integration, heat transfer, thermal management, stress analysis, cost analysis, quality and reliability assessment, and prognostics and health management.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Office of Advanced Engineering Education
2105 J.M. Patterson Building
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College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/electronic-packaging

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.) (p. 173)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

This program is also offered 100% online. Please see Electronic Packaging (Z111) for more information.

Elementary and Middle School Science Education, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Elementary & Middle School Science Education (Z051)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.education.umd.edu

Admissions
Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Program not currently accepting applications	Program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Elementary and Middle School Science Education, Post-Baccalaureate Certificate (P.B.C.) (p. 175)

Energetic Concepts Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

Students select five core courses from the Energetic Concepts core curriculum, and five elective courses approved by the student's advisor.

Course	Title	Credits
Core Requirements		
Select five of the following:		15
ENME707	Combustion and Reacting Flow	
ENPM681	Shockwave Physics I	
ENPM682	Shockwave Physics II	
ENPM683	Chemistry of Energetic Materials	
ENPM684	Rocket Propulsion	
ENPM630	Fundamentals of Solid-Propellant Combustion	
Electives approved by advisor		15
Total Credits		30

Energetic Concepts Engineering (online) (MEEC)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is a practice-oriented part-time graduate program designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments. Late afternoon, evening, and 100% online classes are taught by the College Park faculty and experienced adjunct faculty at the College Park campus and designated learning centers in Maryland.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines (https://fafsa.ed.gov/deadlines.htm).

Contact

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Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

The program is open to qualified applicants holding a regionally accredited baccalaureate degree in engineering or a related field.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory

performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required.

Admission Requirements

Full admission as a degree seeking student requires the following prerequisites:

- A bachelor's degree, GPA of 3.0 or better, in engineering; Civil and Environmental, Mechanical, Chemical and Biomolecular, from an accredited institution.
- Courses in mathematics (Calculus I, II, III, & Differential Equations), and Thermodynamics, Fluid Mechanics, and Heat Transfer.
- Completed applications are reviewed and considered for admission on a case-by-case basis.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not accepting applications for Fall 2018	Not accepting applications for Fall 2018
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not accepting applications for Fall 2018	Not accepting applications for Fall 2018

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Energetic Concepts Engineering, Master of Engineering (M.Eng.) (p. 175)

Facilities and Special Resources

Courses in the Professional Master of Engineering program are currently offered on the College Park campus, at off-campus centers via video-teleconferencing, and 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, the University Center of Northeastern Maryland in Harford County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Energetic Concepts Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Select four of the following:		12
ENPM681	Shockwave Physics I	
ENPM682	Shockwave Physics II	
ENPM683	Chemistry of Energetic Materials	
ENPM630	Fundamentals of Solid-Propellant Combustion	
ENME707	Combustion and Reacting Flow	
Total Credits		12

Energetic Concepts Engineering (online) (Z072)

Graduate Certificate Program
College: Engineering

Abstract

The Professional Master of Engineering program is a practice-oriented part-time graduate program designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments. Late afternoon, evening, and 100% online classes are taught by the College Park faculty and experienced adjunct faculty at the College Park campus and designated learning centers in Maryland.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines (https://fafsa.ed.gov/deadlines.htm).

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200

Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

The program is open to qualified applicants holding a regionally accredited baccalaureate degree in engineering or a related field.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required.

Admission Requirements

Full admission as a degree-seeking student requires the following prerequisites:

- A bachelor's degree, GPA of 3.0 or better, in engineering; Civil and Environmental, Mechanical, Chemical and Biomolecular, from an accredited institution.
- Courses in mathematics (Calculus I, II, III, & Differential Equations), and Thermodynamics, Fluid Mechanics, and Heat Transfer.
- Completed applications are reviewed and considered for admission on a case-by-case basis.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not accepting applications for Fall 2017	Not accepting applications for Fall 2017
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not accepting applications for Fall 2017	Not accepting applications for Fall 2017

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Energetic Concepts Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 176)

Facilities and Special Resources

Courses in the Professional Master of Engineering program are currently offered on the College Park campus, at off-campus centers via video-teleconferencing, and 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, the University Center of Northeastern Maryland in Harford County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Energy Systems Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Students choose five core courses, and five elective courses. All electives must be approved by the student's advisor.

Course	Title	Credits
Select five of the following core courses:		15
ENCH648	Special Problems in Chemical Engineering (ENCH648K - Advanced Fuel Cells and Batteries)	
ENCH648	Special Problems in Chemical Engineering (ENCH648L - Photovoltaics: Solar Energy)	
ENME701	Sustainable Energy Conversion and the Environment	
or ENPM624	Renewable Energy Applications	
ENPM622	Engergy Conversion I - Stationary Power	
ENPM627	Environmental Risk Analysis	
ENPM656	Energy Conversion II -- Mobile Power	
Select five electives approved by advisor		15
Total Credits		30

Energy Systems Engineering (online) (MEEE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Drawing on the innovation and expertise of the University of Maryland Energy Research Center, the Energy Systems Engineering masters program prepares professional engineers for the multi-disciplinary challenges of this rapidly growing field. Students can build on the core

coursework through our defined elective sets in reliability engineering and energy systems or by mixing and matching technical electives.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/energy-systems-engineering.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Energy Systems Engineering, Master of Engineering (M.Eng.) (p. 177)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENPM622	Engergy Conversion I - Stationary Power	3
ENPM624	Renewable Energy Applications	3
ENPM656	Energy Conversion II -- Mobile Power	3
Select one additional approved course		3
Total Credits		12

Energy Systems Engineering (online) (Z082)

Graduate Certificate Program

College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Drawing on the innovation and expertise of the University of Maryland Energy Research Center, the Energy Systems Engineering masters program prepares professional engineers for the multi-disciplinary challenges of this rapidly growing field. Students can build on the core coursework through our defined elective sets in reliability engineering and energy systems or by mixing and matching technical electives.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. Tuition and fees are subject to change.

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

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Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/energy-systems-engineering.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 178)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Energy Systems Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning

worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Students choose five core courses, and five elective courses. All electives must be approved by the student's advisor.

Course	Title	Credits
Select five of the following:		15
ENCH648	Special Problems in Chemical Engineering (ENCH648K - Advanced Fuel Cells and Batteries)	
ENCH648	Special Problems in Chemical Engineering (ENCH648L - Photovoltaics: Solar Energy)	
ENME701	Sustainable Energy Conversion and the Environment	
or ENPM624	Renewable Energy Applications	
ENPM622	Engergy Conversion I - Stationary Power	
ENPM627	Environmental Risk Analysis	
ENPM656	Energy Conversion II -- Mobile Power	
Select five electives approved by advisor		15
Total Credits		30

Energy Systems Engineering (PMSU)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Drawing on the innovation and expertise of the University of Maryland Energy Research Center, the Energy Systems Engineering masters program prepares professional engineers for the multi-disciplinary challenges of this rapidly growing field. Students can build on the core coursework through our defined elective sets in reliablity engineering and energy systems or by mixing and matching technical electives.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/energy-systems-engineering.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Energy Systems Engineering, Master of Engineering (M.Eng.) (p. 179)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Project Management (MEEE) for more information.

Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENPM622	Engergy Conversion I - Stationary Power	3
ENPM624	Renewable Energy Applications	3
ENPM656	Energy Conversion II -- Mobile Power	3
Select one additional approved course		3
Total Credits		12

Energy Systems Engineering (Z066)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Drawing on the innovation and expertise of the University of Maryland Energy Research Center, the Energy Systems Engineering masters program prepares professional engineers for the multi-disciplinary challenges of this rapidly growing field. Students can build on the core coursework through our defined elective sets in reliablity engineering and energy systems or by mixing and matching technical electives.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/energy-systems-engineering.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants

are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 181)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Project Management (Z082) for more information.

Energy Systems Management and Policy, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENME741	Operations Research Models in Engineering	3
ENPM808	Advanced Topics in Engineering (ENPM808Q - Advanced Topics in Engineering)	3
Select two of the following:		6
ENME635	Energy Systems Analysis	
ENPM654	Energy Systems Management	
ENME701	Sustainable Energy Conversion and the Environment	
or ENPM624	Renewable Energy Applications	
Total Credits		12

Energy Systems Management and Policy (Z107)

Graduate Certificate Program
College: Engineering

Abstract

Whether you're an engineer looking to incorporate energy policy aspects into your line of work or a government employee hoping to enhance your engineering training, our graduate certificate program offers important insight into critical topics in energy policy and energy systems analysis as well as applications of management science in engineering. Renowned faculty and policy experts help students understand how economic, environmental, and sustainability agendas can impact both small- and large-scale projects.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/energy-systems-management-policy.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for the full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Energy Systems Management and Policy, Post-Baccalaureate Certificate (P.B.C.) (p. 182)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Engineering and Public Policy, Master of Engineering and Public Policy (M.Eng.Pub.Pol.)

This program is not currently accepting applications.

Engineering and Public Policy (MEPP)

Graduate Degree Program
College: Engineering / Public Policy

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments. Late afternoon, evening, and 100% online classes are taught by the College Park faculty and experienced adjunct faculty at the College Park campus and designated learning centers in Maryland. For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

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University of Maryland
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.eng.umd.edu or http://www.publicpolicy.umd.edu

Admissions
Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications

International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.eng.umd.edu or http://www.publicpolicy.umd.edu

Facilities and Special Resources

Courses in the Professional Master of Engineering program are currently offered on the College Park campus, at off-campus centers via video-teleconferencing, and 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, the University Center of Northeastern Maryland in Harford County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs

English Language and Literature, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

The M.A. degree program requires 30 credit hours of graduate work distributed to assure coverage of major historical fields. The student either may take 24 hours of coursework and write a thesis for the other six hours, or may take 30 hours of coursework and do a capstone writing project. The department also offers a special M.A. with a Concentration in Composition and Rhetoric; this degree program requires 30 credit hours of graduate work, provides thesis and non-thesis options, and balances courses in literature with courses in the theory of composition and rhetoric.

Literature concentration

Course	Title	Credits
ENGL601	Literary Research and Critical Contexts	3
or ENGL602	Critical Theory and Literary Criticism	
Select one course in Critical Theory, Genre, or Rhetoric		3
Select one course in each of the following areas:		12
Medieval and Early Modern		
The Long 18th-century		
The Long 19th-century		
Modern and Contemporary		
Thesis or Non-thesis option:		12
Thesis:		
ENGL799	Master's Thesis Research	
Electives		
Non-thesis:		
Electives		
Writing Project		
Total Credits		30

Writing studies and rhetoric

Course	Title	Credits
ENGL607	Readings in the History of Rhetorical Theory to 1900	3
ENGL775	Seminar in Composition Theory	3
or ENGL776	Seminar in Modern Rhetorical Theory	
Select four additional ENGL designated courses		12
Thesis or Non-thesis option:		12
Thesis:		
ENGL799	Master's Thesis Research	
Electives		
Non-thesis:		
Electives		
Capstone Project		
Total Credits		30

English Language and Literature, Doctor of Philosophy (Ph.D.)

Applicants to the Ph.D. program normally must have a B.A in English Language and Literature. Applicants who wish to pursue a Ph.D. but who do not have a B.A.in English Language and Literature may apply to the M.A. program. In exceptional cases the Admissions Committee may decide to admit a student with a B.A. degree other than in English Language and Literature with the requirement that the student complete extra course work as deemed necessary.

A minimum of 36 credits of coursework is required for students entering the doctoral program without an M.A. A minimum of 27 credits of coursework is required for students entering the doctoral program with an M.A.

The Ph.D. degree program requires a total of 36 credit hours of graduate work. PhD students must also

1. pass a qualifying examination in their areas of specialization;
2. demonstrate, through examination or coursework, evidence of reading competence in a foreign language related to their areas of specialization; and
3. complete a dissertation.

Requirements include:

Course	Title	Credits
Core Requirements		
ENGL601	Literary Research and Critical Contexts	3
ENGL602	Critical Theory and Literary Criticism	3
ENGL611	Approaches to College Composition	3
Select five 700-level seminars		15

Select four additional courses 600-700 level		12
Reading knowledge of one language other than English		
Dissertation Research Requirements		
ENGL899	Doctoral Dissertation Research	12
Total Credits		48

English Language and Literature (ENGL)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of English offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees; particular strengths of the department include early British literature; American literature; literature of the African diaspora; postcolonial and transnational literary studies; digital humanities; feminist theory and gender studies; and composition and rhetoric. The Department also offers a Master of Fine Arts degree in Creative Writing (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?CRWR) (See listing for Creative Writing (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?CRWR)). Most students enrolled in graduate programs in English Language and Literature seek employment in higher education, but many also seek non-academic employment in publishing, business and technical writing, administration, and personnel management. To assist with placement, the department has a Placement Director and the university has a Career Development Center.

Financial Assistance

The English Department, in conjunction with the College of Arts and Humanities and the Graduate School, awards a combination of fellowships and teaching assistantships to admitted PhD candidates. Limited financial aid (usually in the form of teaching assistantships) is available to some incoming MA students.

Contact

Heather Dias
Academic Coordinator
2116 Tawes Hall
7751 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3798
Email: englishgrad@umd.edu

Website: http://www.english.umd.edu

Courses: ENGL

Relationships: Comparative Literature (CMLT) (p. 135), Creative Writing (CRWR) (p. 146)

Admissions

General Requirements

1. Statement of Purpose: Your statement of purpose should address the intended focus of your graduate studies and how your past educational experiences have prepared you for this course of study. If applicable, this statement would also be the place to address any unusual challenges that you may have faced during your academic career and/or the formative nature of any extracurricular activities (i.e. outreach activities, clubs, etc.) that may have had an impact on your intellectual development. (If you are applying to the PhD program but would like to be considered for the MA in the event that a PhD spot is unavailable, please also indicate that here.)
2. Transcript(s)
3. TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

1. Letters of Recommendation (3)
2. Graduate Record Examination (GRE)
3. Academic CV
4. Writing Sample: A single sample of critical writing of approximately 12-20 pages. While we encourage you to submit your best writing sample, we prefer a writing sample in your declared field of interest. The writing sample should include an updated works cited page to help us evaluate your critical and theoretical familiarity with a field, a period or a genre. (Uploaded to the Upload Requirements section of the application).

In addition to fulfilling Graduate School requirements, applicants to the M.A. degree program should present a 3.5 GPA in English and 24 hours of upper-level English courses. Applicants to the Ph.D. degree program should present at least a 3.7 GPA and a B.A. degree, normally in English Language and Literature. All M.A. and Ph.D. applicants should submit a single critical writing sample of 12-20 pages as indicated on the application guidelines. General GREs are also required. For best consideration, complete applications for all degree programs should be submitted by December 7. Applications are not accepted after December 7. The Admissions Committee will begin reviewing applications immediately. Admission is for the Fall semester only.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	7 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	7 Dec

Other Deadlines: Please visit the program website at http://www.english.umd.edu

Requirements

- English Language and Literature, Doctor of Philosophy (Ph.D.) (p. 184)
- English Language and Literature, Master of Arts (M.A.) (p. 184)

Facilities and Special Resources

Resources for research in the College Park and Washington, D.C. area are unsurpassed. The university's libraries hold over 2,000,000 volumes. In addition to the outstanding holdings of the Library of Congress, the area also offers the specialized resources of the Folger Shakespeare Library, Dumbarton Oaks, the National Archives, the Smithsonian Institution, and the National Center for the Study of the Visual Arts among others

UMCP is a member of the Consortium of Institutions in the Washington area, which permits graduate students at College Park to enroll in courses at other universities for graduate credit at UMCP. Graduate students in English also may take courses for graduate credit at the Folger Institute, which runs a series of seminars by distinguished scholars each year.

Entomology, Master of Science (M.S.)

Thesis only: 30 credits

In the M.S. program, the student is given latitude in the selection of the advisory study committee, the choice of a study area, and the selection of a research program. The student must take core courses and specific courses required by the study area committee. The M.S. degree is awarded following the successful completion of course work (24 credits), thesis research (6 credits) and thesis defense.

Course	Title	Credits
Required courses:		
BSCI481	Insect Diversity and Classification	4
ENTM699	Advanced Entomology (ENTM699W - Insect Physiology and Molecular Biology)	3
Remainder of coursework approved with advisor:		17
Three topic seminars, one of which must be in Bioethics (credits may vary)		
Thesis research:		
ENTM799	Master's Thesis Research	6
Total Credits		30

Entomology, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 28 credits of coursework, including three core courses and five topic seminars (ENTM798). In addition, students are required to complete 12 credits of ENTM899, pass a qualifying exam, and attend all Entomology Colloquium sessions.

The Ph.D. program provides diverse opportunities for the selection of a dissertation question, composition of advisory committee, and selection of an area of specialization. In addition to core course requirements, course work (28 credits) and dissertation research (12 credits), targeting an area of specialization is determined by the advisory study committee. Following completion of most course work, the student must pass a proposal defense and oral qualifying examination for advancement to candidacy. The degree is awarded after successful completion of the dissertation defense exam.

Course	Title	Credits
Required courses:		
BSCI480	Arthropod Form and Function	4
BSCI481	Insect Diversity and Classification	4
ENTM699	Advanced Entomology (ENTM699W - Insect Physiology and Molecular Biology)	3
ENTM798	Topic Seminar (Complete five topic seminars)	5
Dissertation Research Requirements		
ENTM899	Doctoral Dissertation Research	12
Total Credits		28

Entomology (ENTM)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Department of Entomology offers Doctor of Philosophy and Master of Science degrees. Graduate students may conduct research in a range of both basic and applied topics, including insect ecology and behavior, physiology, morphology, evolution and biosystematics, insect pathology, molecular biology and genetics, aquatic entomology, pollinator biology and apiculture, and integrated pest management.

Employment opportunities for graduates exist in industry; academia and extension; federal, state and local governments; private and non-profit arenas; and in international and national spheres.

Financial Assistance

Graduate students are supported primarily in two ways. Many students are supported by extramural funding sources, usually obtained by the student's faculty advisor or student for research on a specific topic. The second type of support is provided by the department from internal funds via university and departmental fellowships, and teaching and research assistantships. Teaching and research assistantships are available on a competitive basis. Teaching assistants usually instruct undergraduate laboratory and recitation classes and receive in return a tuition waiver of ten credits each semester. Those students whose records indicate superior academic achievement and promise may also be competitive for university and departmental fellowships. Several part-time employment opportunities are also available in governmental and private research and developmental laboratories in the area. Regardless of the initial source of funding, the department makes a financial commitment to each graduate student. In the case of master's students, support is provided for the first three years of the program only. In the case of doctoral students, five years of support is provided but must be used during the first six years of the student's program. Support is usually for the full 12 months per year.

Contact

Jeffrey Shultz, PhD
Graduate Director
Department of Entomology
4112 Plant Sciences Building
4291 Fieldhouse Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7519
Fax: 301.314.9290
Email: jshultz@umd.edu

Website: http://www.entm.umd.edu

Courses: BSCI ENTM

Relationships: Biological Sciences (BISI) (p. 81), Marine, Estuarine, and Environmental Sciences (MEES) (p. 283), Sustainable Development and Conservation Biology (CONS) (p. 396)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Description of Research

Students applying for graduate work in entomology are expected to have a strong background in the biological or agricultural sciences, chemistry, genetics, and mathematics. An undergraduate degree in entomology is not required, but a strong basic preparation is preferred for admission to the program.

Admission is granted on the basis of the following criteria by the Graduate Affairs Committee: Analysis of transcripts, including course selection and GPA, letters of recommendation, statement of purpose for pursuing the degree, GRE scores, and acceptance by a graduate faculty advisor. International applicants must also submit proof of English proficiency (TOEFL, iBT or IELTS scores). Acceptance by an advisor is absolutely required; thus, it helps to make contact with faculty when applying.

Upon admission to the M.S. or Ph.D. program, the student's study committee suggests a program of course work and approves a detailed research proposal.

Applicants are encouraged to contact Entomology faculty with shared research interests. To explore matches of your interests with those of ENTM faculty, see the Entomology website (http://entomology.umd.edu).

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	14 Dec

Other Deadlines: Please visit the program website at http://www.entm.umd.edu

Requirements

- Entomology, Doctor of Philosophy (Ph.D.) (p. 186)
- Entomology, Master of Science (M.S.) (p. 186)

Facilities and Special Resources

The department is housed in a modern research facility on campus, where state-of-the-art offices, laboratories, environmental growth chambers, multimedia classrooms, and lecture halls provide an excellent environment for research and teaching. Students have individual workstations and access to sophisticated computer graphic facilities. The department also shares extensive technical expertise and scientific equipment with other departments on campus. The university's strategic location in the Washington, DC area provides many opportunities for students to conduct research and gain hands-on experience in federal facilities, such as the Smithsonian Institution, USDA-ARS Beltsville Agricultural Research Center, Walter Reed Army Institute of Research, and NIH. Vast resources are available in the university's library system and nearby federal libraries. The USDA's National Agriculture Library at Beltsville is only four miles from the campus, and the Library of Congress is in nearby Washington, DC. Besides the main campus, the Maryland Agriculture Experiment Station has Research and Education Centers in the state where field and laboratory work is carried out on urban and agricultural insects. Land use and technical services at these centers are available to faculty and students.

Environmental Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Select seven of the following:		21
ENCE630	Environmental and Water Resource Systems I	
ENPM621	Heat Pump and Refrigeration Systems Design Analysis	
ENPM622	Engergy Conversion I - Stationary Power	
ENPM623	Control of Combustion Generated Air Pollution	
ENPM624	Renewable Energy Applications	
ENPM625	Heating, Ventilation and Air Conditioning of Buildings	
ENPM626	Waste to Energy Conversion	
ENPM627	Environmental Risk Analysis	
ENPM635	Thermal Systems Design Analysis	
ENPM651	Heat Transfer for Modern Application	
ENPM653	Environmental Law for Engineers and Scientists	
Select three technical electives approved by advisor		9
Total Credits		30

Environmental Engineering (PMEN)

Graduate Degree Program

College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

This program prepares graduates to better preserve and protect human and environmental health from harmful activities, contaminants, and pathogens. Courses provide insight into pressing issues such as drinking water supply and treatment, wastewater treatment, air pollution management, solid waste management, and sustainable energy systems.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/environmental.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Environmental Engineering, Master of Engineering (M.Eng.) (p. 187)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Select four of the following:		12
ENPM621	Heat Pump and Refrigeration Systems Design Analysis	
ENPM622	Engergy Conversion I - Stationary Power	
ENPM623	Control of Combustion Generated Air Pollution	
ENPM624	Renewable Energy Applications	
ENPM625	Heating, Ventilation and Air Conditioning of Buildings	

ENPM626	Waste to Energy Conversion	
ENPM627	Environmental Risk Analysis	
ENPM635	Thermal Systems Design Analysis	
ENPM651	Heat Transfer for Modern Application	
ENPM653	Environmental Law for Engineers and Scientists	
Total Credits		12

Environmental Engineering (Z058)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

This program prepares graduates to better preserve and protect human and environmental health from harmful activities, contaminants, and pathogens. Courses provide insight into pressing issues such as drinking water supply and treatment, wastewater treatment, air pollution management, solid waste management, and sustainable energy systems.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/environmental.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for the full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 188)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Environmental Health Sciences, Master of Science (M.S.)

Thesis option: 32 credits
Non-thesis option: 32 credits

Course	Title	Credits
Required courses:		
MIEH600	Foundations of Environmental Health	3
MIEH720	Principles of Toxicology	3
MIEH740	Environmental Health Risk Assessment	3
MIEH771	Exposure Assessment of Environmental Hazards	3
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
MIEH609	Methods in Environmental Health	3
SPHL611	Public Health Ethics	1
or SPHL612	Research Ethics	
MIEH688	Seminar in the Maryland Institute for Applied Environmental Health: Current Topics in Environmental Health	2
SPHL600	Foundations of Public Health	3
Thesis or Non-thesis option:		6
Thesis:		
MIEH799	Master's Thesis Research	
Non-thesis:		
MIEH789	Independent Study	
Elective		
Total Credits		32

Environmental Health Sciences, Doctor of Philosophy (Ph.D.)

The PhD program in Environmental Health Sciences consists of a minimum of 46 credit hours of graduate courses depending on the incoming student's previous coursework. In particular, students without an MPH degree will require additional coursework as required by the public health accrediting body (CEPH). Graduate courses include (1) core courses within environmental health, epidemiology and biostatistics; (2) supporting courses in environmental health research, ethics, public health, and grant writing; (3) specialized courses selected within the research foci; and (4) dissertation credits. Program requirements for a PhD degree also include successful completion of a written and oral comprehensive exam, oral defense of a written dissertation research proposal, and a minimum of 12 credits of PhD dissertation research, written dissertation, and a final dissertation defense. The program can be completed on either a full- or part time basis. It is anticipated that students will complete more than the minimum number of credits.

Some core coursework may be waived based on previous courses taken at UMD or in another master's program. Students would not be able to waive out of all rotations or the seminar requirements. Rotations can be in physical labs or with faculty conducting non-laboratory based research. At least 1 rotation must be outside of the students focus area. Students would not be able to waive out of any of the 12 to 15 credits required for the specialization area. No more than 6 credits of MIEH 898 could be taken as part of the specialization area.

Environmental Health Sciences (ENVH)

Graduate Degree Program
College: Engineering

abstract

Students in the **M.S. program** in Environmental Health Sciences at the Maryland Institute for Applied Environmental Health (MIAEH) in the School of Public Health will complete an essential core of knowledge in environmental health, epidemiology and biostatistics, in addition to a laboratory rotation, an ethics course, and a seminar course.

Students in the **Ph.D. program** in Environmental Health Sciences at MIAEH in the School of Public Health will master an essential core of knowledge in environmental and occupational health, epidemiology and biostatistics. Elective courses and rotations with faculty field studies and laboratories will offer students the knowledge and skills needed to specialize within the broader area of environmental health and become independent researchers.

CONTACT

Paul Turner, Ph.D.
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Website: http://sph.umd.edu/department/miaeh

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

PROGRAM-SPECIFIC REQUIREMENTS

- 3 Letters of Recommendation
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample
- Description of Research/Work Experience

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Ph.D. only: 1 Mar / M.S. only: 1 May
International Applicants	

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Ph.D. only: 1 Mar / M.S. only: 1 Mar

Requirements

No results were found.

No results were found.

Environmental Health Sciences, Master of Public Health (M.P.H.)

Non-thesis only: 45 credits

Course	Title	Credits
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
MIEH600	Foundations of Environmental Health	3
MIEH720	Principles of Toxicology	3
MIEH740	Environmental Health Risk Assessment	3
MIEH770	Law and Policy in Environmental Health	3
MIEH771	Exposure Assessment of Environmental Hazards	3
MIEH780	Occupational Health	3
MIEH786	Captsone Project in Public Health	3
MIEH778	Internship in Public Health	4
Electives		6
Total Credits		45

Environmental Health Sciences (MIEH)

Graduate Degree Program
College: Public Health

Abstract

The Maryland Institute for Applied Environmental Health (MIAEH) offers a **Master of Public Health (MPH)** degree with a concentration in Environmental Health Sciences. Environmental Health Science is a discipline that investigates biological, chemical, and physical factors that affect the health of human beings and their communities. Focusing on interrelationships between people and their environments, the discipline seeks to translate environmental health research into effective public health practice; promote human health and well-being; and foster safe and healthy environments. Environmental public health scientists address issues such as the control of epidemic diseases, food and water safety, treatment and disposal of liquid and airborne wastes, elimination of workplace stressors, and the role of environment in chronic illnesses. Environmental health sciences professionals also tackle the effects of long-range problems, including the effects of toxic chemicals and radioactive waste, acidic deposition, depletion of the ozone layer, and global warming on human health. The program additionally seeks to understand the effects of adverse built environments and environmental injustice in its approach to interventions promoting applied environmental health for all.

MIAEH also has a **PhD program in Toxicology and Environmental Health** (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?TOXI). Additionally, we support students interested in a **PhD in Environmental Epidemiology** (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?EPID).

Contact

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Email: mrocque@umd.edu

Website: http://sph.umd.edu/department/miaeh

Courses: MIEH

Relationships: Behavioral and Community Health (BCHL) (p. 68), Behavioral and Community Health (MBCH) (p. 70), Biostatistics (BIOS) (p. 85), Epidemiology (EPDM) (p. 195), Epidemiology (EPID) (p. 196), Health Administration (HLSA) (p. 230), Maternal and Child Health (MCHS) (p. 290), Toxicology (TOXI) (p. 414)

Admissions

Admissions Information

Applications should be submitted through the Schools of Public Health Application Service, (SOPHAS), at www.SOPHAS.org (http://www.SOPHAS.org). The 2016-2017 application cycle opens in SOPHAS in September and all application documents must be submitted via SOPHAS. Remember to designate the **University of Maryland School of Public Health, College Park** (SOPHAS Code 0485) as one of your school choices along with your desired program. SOPHAS will verify submission, and if complete, SOPHAS will inform the University of Maryland Graduate School. The verification process can take 4-6 weeks to complete. We do not accept materials outside of the SOPHAS process. The University of Maryland Graduate School requires a Supplemental Application and a Supplemental Application Fee of $75 for each program. This request will be made by the Graduate School once your SOPHAS information is verified by SOPHAS. MIAEH will be able to review ONLY after both stages above are complete, thus there may be a some delay in you submitting and getting a final decision.

TOEFL or IELTS scores are required for some international students; see the Graduate School web site for further details and minimum requirements for admission

http://www.gradschool.umd.edu/admissions/international-admissions

The School of Public Health has an Open House Event where you can meet faculty and students from MIAEH. For Further details contact Dr Evelyn C. King-Marshall (eckm@umd.edu (link sends e-mail)). Other events will be posted throughout the fall semester.

MPH Admissions Criteria

Minimum 3.0 undergraduate GPA; outstanding performance in quantitative-oriented courses

Official GRE scores taken within the past 5 years (GRE scores are required and should be requested directly from ETS for electronic transmission to SOPHAS. The school code is 0485). ***Students with an existing graduate degree should contact the department to discuss GRE requirements.***

Three letters of recommendation that address your academic capabilities

Your statement of purpose should address each of the following questions:

1. describe your specific interest in Environmental Health Sciences;
2. what previous experiences have influenced your decision to pursue a degree in Environmental Health Sciences; and
3. how do you believe UMD's program will help you reach your career goals.

Discuss any relevant academic/work experience, including previous coursework in public health, climate change, environmental science, environmental justice, chemistry and statistical methods.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority Consideration: 14 Dec / Final: 12 Apr	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Priority Consideration: 14 Dec / Final: 15 Feb	N/A

Other Deadlines: Please visit the program website at http://sph.umd.edu/department/miaeh

Requirements

- Environmental Health Sciences, Master of Public Health (M.P.H.) (p. 191)

Facilities and Special Resources

The proximity of the University of Maryland, College Park to the nation's capital offers prospective students unparalleled opportunities for internships and research experiences in public health, including placements at the National Institutes of Health, the CDC Washington Office, the U.S. Department of Health and Human Services, Children's National Medical Center, the Maryland Department of Health and Mental Hygiene, and many other national, state, and local health agencies. The diversity of cultural and socioeconomic groups, communities, industries, and health organizations provides a rich environment for learning, research, public policy analysis, and service.

Environmental Policy, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Environmental Policy (EPOL)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Environmental Policy, Post-Baccalaureate Certificate (P.B.C.) (p. 192)

Environmental Policy, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Environmental Policy (Z008)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Environmental Policy, Post-Baccalaureate Certificate (P.B.C.) (p. 192)

Environmental Science and Technology, Master of Science (M.S.)

Thesis only: 30 credits

Students must complete 30 credits of coursework including 6 credits of thesis research. All students must select an area of specialization and complete the specific track requirements.

Course	Title	Credits
Required courses:		
ENST602	Research Principles and Methodology in Environmental Scienceand Technolgy	3
ENST702	Environmental Science and Technology: Communication and Professional Development	2
ENST798	Graduate Seminar	2
ENST799	Master's Thesis Research	6
One graduate level statistics course		4
Choose an area of specialization		minimum of 12 credits
Soil and Watershed Sciences:		
Courses must be from the following five areas: soil chemistry, soil physics, pedology, soil biology, soil fertility		
Ecological Technology Design:		
Six credits of graduate level courses in ecology and six credits of graduate level courses in ecological design or related engineering courses		
Wetland Science:		
Minimum of three credits must be earned from each of these groups: Ecology, Soil Science, and Hydrology		
Ecosystem Health & Natural Resource Management:		
ENST604	Advanced Ecological and Natural Resource Ethics	
Nine additional credits in Ecosystem Health and Natural Resource Management		

Environmental Science and Technology, Doctor of Philosophy (Ph.D.)

To earn a Ph.D. degree, the University of Maryland Graduate School requires that the student complete a minimum of 12 credits of dissertation research (ENST899) and complete and successfully defend a dissertation based on original research.

ENST Departmental Core Requirements: All ENST Ph.D. students are expected to complete a minimum of 50 credits beyond the B.S. degree (in addition to research credits ENST898 and ENST899) and are required to complete ENST602, ENST702 and two graduate level statistics courses (these can be taken during either the M.S. or Ph.D. program), and two semesters of Graduate Seminar (ENST798).

Course	Title	Credits
Required courses:		
ENST602	Research Principles and Methodology in Environmental Scienceand Technolgy	3
ENST702	Environmental Science and Technology: Communication and Professional Development	2
ENST798	Graduate Seminar	2
ENST799	Master's Thesis Research	6
Select two graduate level statistics courses, if not already completed in the M.S. program		
Choose an area of specialization		minimum of 12 credits
Soil and Watershed Sciences:		
Complete one semester of graduate level physical chemistry or biochemistry and at least one additional graduate level course in chemistry, biochemistry, physics, mathematics, engineering, or computer science		
Ecological Technology Design:		
Complete one semester of graduate level systems modeling and one additional graduate level course in ecology, ecological design or ecological engineering		
Wetland Science:		
Complete one graduate level course in modeling; two additional graduate level courses from within the areas of Ecology, Soil Science, or Hydrology		
Ecosystem Health and Natural Resource Management:		
Complete three additional graduate level courses in Ecosystem Health and Natural Resource Management		
Dissertation Research Requirements		
ENST899	Doctoral Dissertation Research	12

Environmental Science and Technology (ENST)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Department of Environmental Science and Technology (ENST) offers graduate programs leading to the Master of Science and Doctor of Philosophy degrees. ENST students can choose to work within one of four specializations: Soil and Watershed Sciences; Ecological Technology Design; Wetland Science; Ecosystem Health and Natural Resource Management.

Financial Assistance

ENST offers a number of graduate assistantships to qualified applicants that are awarded on a competitive basis. To apply, use the form for requesting financial assistance included in the Graduate School application packet. In addition to a competitive stipend, graduate assistants receive tuition remission and are offered excellent health benefits by the University of Maryland.

Contact

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Email: gradstudies-enst@umd.edu

Website: http://www.enst.umd.edu

Courses: ENST

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://drupal-base-s3-drupalshareds3-1qwpjwcnqwwsr.s3.amazonaws.com/gradschool/s3fs-public/uploads/admissionsforms/umd_supplementary_application_enst.pdf)
- Publications/Presentations

Students seeking admission should have strong training in the basic sciences and mathematics. To be admitted with full admission status, a student must have completed a minimum of one semester of Calculus and a total of at least 20 credits in some combination of basic level Chemistry, Physics, Biology or Mathematics (beyond Calculus I). It is also helpful for applicants to have completed other courses in science and engineering. Applicants to the M.S. program must have earned a B.S. degree in a related field with an undergraduate cumulative GPA of 3.0 or higher. Applicants to the Ph.D. degree program must have earned an M.S. Degree in a closely related field. In special cases students may be admitted to a Ph.D. program without first completing an M.S. degree provided these students have:

1. an exceptional academic record and test scores; and
2. have demonstrated significant research experience during their B.S. program (such as completion of a research based honors thesis.)

Graduate Record Examination scores (GRE - General Test) are required of all applicants. International applicants must also submit TOEFL scores

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	18 Dec	25 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	18 Dec	25 Sep

Other Deadlines: Please visit the program website at http://www.enst.umd.edu

Requirements

- Environmental Science and Technology, Doctor of Philosophy (Ph.D.) (p. 193)
- Environmental Science and Technology, Master of Science (M.S.) (p. 193)

Facilities and Special Resources

The Department has many well-equipped laboratories designed to carry out basic and applied research in Soil and Watershed Sciences, Ecological Technology Design, Wetland Science, and Ecosystem Health and Natural Resources Management. Laboratories are located on the College Park campus in H.J. Patterson Hall and the ANSC/AGEN Building. Greenhouse facilities are available on campus and a statewide network of research and education centers as well as our proximity to Chesapeake Bay provide access to a wide range of environmental conditions for research. Students have access to computer resources in the department and a comprehensive computer center located on campus. The University Libraries on campus and the National Agricultural Library located nearby, supplemented by the Library of Congress, make the library resources

accessible to students among the best in the nation. Many ENST projects are conducted in cooperation with other departments on campus and with professionals at various scientific centers in the area. Scientists at the USDA-ARS, US Geological Survey, the National Academy of Sciences, NASA, National Institutes of Health, Department of Energy, Smithsonian, and National Park Service, US Fish & Wildlife Service, as well as other agencies, have cooperated with ENST faculty on various projects. Scientists from some of these agencies have adjunct appointments in the Department, have taught special courses at the University, and participate on graduate committees.

Epidemiology, Master of Public Health (M.P.H.)

Non-thesis only: 45 credits

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
EPIB611	Intermediate Epidemiology	3
EPIB651	Applied Regression Analysis	3
EPIB612	Epidemiologic Study Design	3
EPIB697	Public Health Data Management	3
EPIB778	Internship in Public Health	4
EPIB786	Capstone Project in Public Health	3
Electives		12
Total Credits		45

Epidemiology (EPDM)

Graduate Degree Program
College: Public Health

Abstract

Epidemiology is the study of the distribution and determinants of disease, and other health states in human populations. As the fundamental science of public health practice, epidemiology provides the conceptual and applied tools necessary for the study of public health problems. The MPH with a concentration in Epidemiology is a 45-credit professional degree that prepares graduates to work in public health services as practitioners, researchers, administrators, and consultants. A full-time student may complete our program in 2 years. Part-time students may take up to 4 years to complete the program. The majority of courses are offered in the evenings. In addition to coursework, all epidemiology masters' students are required to complete a 240-hour internship and an independent project.

Our proximity to the nation's capital offers students unparalleled opportunities for research experiences in public health, including placements at the National Institutes of Health, National Center for Health Statistics, Centers for Disease Control, Food and Drug Administration, the Maryland Department of Health and Mental Hygiene, and many other national, state, and local health agencies.

Contact

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College Park, MD 20742
Telephone: 301.405.2491
Email: bsaksvig@umd.edu

Website: http://sph.umd.edu/department/epib

Courses: EPIB

Admissions

Applications for the MPH program with concentration in Epidemiology are reviewed with consideration to the following criteria:

1. Minimum 3.0 undergraduate GPA; outstanding performance in quantitative-oriented courses
2. Official transcripts for all completed college courses should be submitted directly to SOPHAS
3. Test scores. Official GRE and English proficiency (IELTS and TOEFL) scores, taken within the past 5 years, must be sent to 0485 (UMD SOPHAS code). GRE scores should be at least in the 50th percentile for all sections.
4. Three letters of recommendation that address the applicant's academic capabilities and probability of success in graduate school
5. **Statement of Purpose:** your statement of purpose should address each of the following questions:
   a. describe your specific interest in epidemiology;
   b. what previous experiences have influenced your decision to pursue a degree in epidemiology; and
   c. how do you believe UMD's program will help you reach your career goals.
6. Relevant academic/work experience, including previous coursework in human biology or physiology, and statistical methods.

The University of Maryland requires a Supplemental Application and a Supplemental Application Fee of $75 for each program. Applicants will receive e-mail instructions for how to complete the Supplemental Application once your SOPHAS application is complete. **Applicants to the MPH program with concentration in Epidemiology should be sure to use the major code EPDM when selecting the program on the Supplemental Application.**

How to Apply: Applications should be submitted through the Schools of Public Health Application Service (SOPHAS) at www.SOPHAS.org (https://sophas.org). Remember to designate the University of Maryland School of Public Health, College Park, as one of your school choices along with your desired program. The University of Maryland School of Public Health GRE Code in SOPHAS is 0485 (the GRE is required in all applications). For information please see http://sph.umd.edu/content/graduate-admissions.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority Consideration: 14 Dec / Final: 12 Apr	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Priority Consideration: 14 Dec / Final: 12 Apr	N/A

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Epidemiology, Master of Public Health (M.P.H.) (p. 195)

Facilities and Special Resources

The Department of Epidemiology and Biostatistics faculty includes individuals with multi-faceted interests in both epidemiology and biostatistics. Our faculty has multi-faceted interests and expertise in the epidemiology of infectious disease and chronic disease with particular focus in the areas of HIV/STIs, cancer, health disparities, cardiovascular disease, obesity/physical activity, and sexual and reproductive health. Additional areas of specialization include social and behavioral determinants of health, aging, cultural competency, and community-based interventions. Biostatistics faculty apply statistical techniques including survival and longitudinal analysis, computational statistics, statistical analysis of genomic and proteomic data, machine learning, neuroimaging statistics, (network) meta-analysis, missing data analysis, Bayesian hierarchical methods, and bioinformatics to analyze and interpret health data.

Epidemiology, Doctor of Philosophy (Ph.D.)

The PhD in Epidemiology requires a minimum of 64 credits beyond the master's degree in epidemiology or public health, including 12 credits of EPIB899. Students are also required to complete a minimum of 12 credits in a specialization cognate area, included in the 64 credit total. There is an additional 13 credits of prerequisite courses that must be completed during the doctoral program or prior to admission. Students who have not taken the prerequisites would complete a total of 77 credits.

Students admitted to the Ph.D. program advance to candidacy upon completing required coursework and passing a written comprehensive examination with an oral defense. After advancement to candidacy, students must complete a dissertation proposal and oral defense, followed by successful completion of the doctoral dissertation and oral defense.

Course	Title	Credits
Required courses:		
SPHL602	Foundations of Epidemiology and Biostatistics	4
EPIB611	Intermediate Epidemiology	3
EPIB651	Applied Regression Analysis	3
EPIB697	Public Health Data Management	3
SPHL600	Foundations of Public Health	3
EPIB612	Epidemiologic Study Design	3
EPIB620 or EPIB621	Chronic Disease Epidemiology or Infectious Disease Epidemiology	3
SPHL612	Research Ethics	1
EPIB652	Categorical Data Analysis	3
EPIB653 or EPIB655	Applied Survival Data Analysis or Longitudinal Data Analysis	3
EPIB710	Grantsmanship for Epidemiologic Research	3
EPIB740	Advanced Methods in Epidemiology	3
EPIB788	Critical Readings in Epidemiology and Biostatistics	3
EPIB798	Independent Study	3
Electives		12
Specialization Requirements		
Complete minimum of 12 credits in a specialization cognate area		12
Dissertation Research Requirement		
EPIB899	Doctoral Dissertation Research	12
Total Credits		77

Epidemiology (EPID)

Graduate Degree Program
College: Public Health

Abstract

The Department of Epidemiology and Biostatistics offers a Ph.D. program in Epidemiology. Students in the PhD program in Epidemiology master core knowledge in epidemiologic and biostatistical methods related to the design, implementation and evaluation of public health studies surrounding psychosocial, behavioral, biological, and cultural factors. Students may work with their advisor to design their own research specialization or they may apply to one of our two specializations:

1. Social Epidemiology or
2. Environmental Epidemiology.

Our students have full access to faculty who will guide you through all phases of the program to ensure your educational goals are met. Our Washington, DC area location provides unparalleled opportunities for research experiences in public health, including placements at the U.S. Department of Health and Human Services (e.g., National Institutes of Health, National Center for Health Statistics), Children's National Medical Center, the Maryland Department of Health and Mental Hygiene, and many other national, state, and local health agencies.

Financial Assistance

The Department offers a limited number of fellowships, and graduate teaching and research assistantships.

Contact

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Telephone: 301.405.2491

Email: bsaksvig@umd.edu

Website: http://www.sph.umd.edu

Courses: EPIB

Relationships: Behavioral and Community Health (BCHL) (p. 68), Biostatistics (BIOS) (p. 85), Environmental Health Sciences (MIEH) (p. 191), Epidemiology (EPDM) (p. 195), Health Administration (HLSA) (p. 230), Maternal and Child Health (MCHS) (p. 290), Toxicology (TOXI) (p. 414)

Admissions

Applications should be submitted through the Schools of Public Health Application Service, SOPHAS at www.SOPHAS.org (http://www.SOPHAS.org). The 2015-2016 application cycle opens in SOPHAS in September and all application documents must be submitted via SOPHAS. Remember to designate the University of Maryland School of Public Health, College Park, as one of your school choices along with your desired program.

The University of Maryland requires a Supplemental Application and a Supplemental Application Fee of $75 for each program. Applicants will receive e-mail instructions for how to complete the Supplemental Application once your SOPHAS application is complete. The doctoral program in Epidemiology accepts only full-time students.

Applications for the doctoral program in Epidemiology are reviewed with consideration to the following criteria:

1. Master's Degree (MPH, MHS, MA, MS)
2. Minimum 3.0 undergraduate GPA
3. Undergraduate and graduate transcripts
4. Official GRE scores taken within the past 5 years (GRE scores are required and should be requested directly from ETS for electronic transmission to SOPHAS. Use the SPH code 0485 and the Graduate School Code 5814). Scores should be at minimum in the 50th percentile for each section.
5. 3 letters of recommendation that address the applicant's academic capabilities and probability of success in graduate school
6. **Statement of Purpose:** the statement of purpose should address each of the following questions:
   a. describe your specific areas of interest within epidemiology;
   b. which primary faculty members in the Department of Epidemiology and Biostatistics do you think most closely share your areas of interest;
   c. what previous experiences have influenced your decision to pursue a degree in epidemiology;
   d. how do you believe UMD's program will help you reach your career goals; and
   e. how do you see yourself using this degree in the five years following graduation?
7. Relevant academic/work experience, including previous coursework in human biology or physiology, demonstration of proficiency in statistical methods and statistical software, and research presentation or publication experience.

Applicants are strongly recommended to communicate with the epidemiology faculty member in their area(s) of interest before applying.

Applicants should also be sure to use the major code EPID when selecting the program on the Supplemental Application.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority Consideration: 16 Nov / Final: 15 Feb	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Priority Consideration: 16 Nov / Final: 15 Feb	Please visit the program website

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Epidemiology, Doctor of Philosophy (Ph.D.) (p. 196)

Facilities and Special Resources

The Department of Epidemiology and Biostatistics faculty includes individuals with multi-faceted interests in both epidemiology and biostatistics. Our faculty have research interests and expertise in the epidemiology of infectious disease and chronic disease with particular focus in the areas of HIV/STIs, cancer, health disparities, cardiovascular disease, obesity/physical activity, and sexual and reproductive health. Additional areas of specialization include social and behavioral determinants of health, aging, cultural competency, and community-based interventions. Biostatistics faculty apply statistical techniques including survival and longitudinal analysis, computational statistics, statistical analysis of genomic and proteomic data, machine learning, neuroimaging statistics, (network) meta-analysis, missing data analysis, Bayesian hierarchical methods, and bioinformatics to analyze and interpret health data.

Ethnomusicology, Master of Arts (M.A.)

Thesis option: 35 credits
Non-thesis option (scholarly paper): 35 credits

The Master of Arts Degree (Thesis Option in Ethnomusicology, Music Education, Music History and Literature [Musicology], or Music Theory; Non-Thesis Option in Ethnomusicology or Music History and Literature [Musicology]) requires a minimum of 30 credit hours (35 for Ethnomusicology), with a minimum of 12 credit hours in Major Studies, 9 credit hours in Studies in Areas Supporting the Major (14 for Ethnomusicology), and 9 credit hours in Other Studies in Music. In addition, a grade of B- or better is required in all courses used to fulfill requirements for the degree; a Thesis must be written (Ethnomusicology Non-Thesis Option requires two scholarly research papers), an oral defense of the Thesis (or research papers) must be passed; and a written comprehensive examination must be passed. Specific courses are required in each area of specialization.

Students must complete the following courses. In most cases, students are also required to have knowledge of one language other than their native language. All students must enroll in the School of Music's

World Music Ensembles for at least two semesters (taking two different ensemble types).

Course	Title	Credits
Required courses:		
MUSC632	The Anthropology of Music	3
MUSC633	Field Methods in Ethnomusicology I	3
MUSC676	Historical Theory and Method in Ethnomusicology	3
MUSC677	Current Theory and Method in Ethnomusicology	3
MUSC438	Area Studies in Ethnomusicology (MUSC438X - Area Studies in Ethnomusicology)	3
MUSC646	Introduction to Musicology	3
MUSC629	Ensemble (MUSC629X - Performance electives)	2
Other Studies in Music		9
Thesis or Non-Thesis Requirements		
Select one of the following:		6
Thesis:		
MUSC799	Master's Thesis Research	
Non-Thesis:		
Two seminar courses, two scholarly papers		
Total Credits		35

Ethnomusicology, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 36 credits, including 12 credits of MUSC899. In addition, students are required to pass a foreign language exam.

The Doctor of Philosophy degree requires the satisfactory completion of a significant body of coursework that, in the student's and Graduate Advisor's judgement, prepares the student for the preliminary examination that leads to admission to candidacy, as well as certain specific courses required in each area of specialization. A grade of B- or better is required in all courses used to fulfill requirements for the degree. A dissertation (whether written, or in project form) is required for all doctoral degrees in music. A Principal Advisor for the dissertation will be chosen by the student and the academic advisor; the Principal Advisor and the student will then nominate the remaining members of the dissertation committee. The student must submit a detailed Prospectus of the dissertation to the members of the dissertation committee and the Graduate Director, and must be admitted to candidacy prior to the approval of the dissertation committee by the Graduate School. The dissertation must be successfully defended before the entire dissertation committee. The Doctor of Philosophy degree requires a Written Dissertation.

Course	Title	Credits
Required courses:		
MUSC620	Analysis of World Music	3
MUSC679	Seminar in Ethnomusicology	3
MUSC679	Seminar in Ethnomusicology	3
MUSC438	Area Studies in Ethnomusicology (MUSC438X - Area Studies of Ethnomusicology)	3
Electives		12
Doctoral Dissertation Research Requirements		
MUSC899	Doctoral Dissertation Research	12
Total Credits		36

Ethnomusicology (MUET)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Music offers programs of study leading to the Master of Arts degree with areas of specialization in ethnomusicology, music history and literature (musicology), music education, and music theory; the Master of Music degree with areas in performance, composition, conducting, and music education; the Doctor of Philosophy degree with areas of specialization in ethnomusicology, musicology, music education, and music theory; and the Doctor of Musical Arts degree with areas of specialization in composition, performance, and conducting.

Financial Assistance

A number of competitive fellowships, graduate assistantships, teaching assistantships, opera assistantships, and orchestral assistantships are available. Preference for financial assistance will be given to those who have filed an application for admission to the University and the School of Music Supplemental Application by December 1 (for performance programs) and January 15 (for Music Education only) and have been officially admitted.

Contact

School of Music: The Academic Handbook is available online (http://www.music.umd.edu/current_students/handbooks) and provides descriptive information, details of course requirements, examination procedures, and graduation requirements for the M.A., M.M., D.M.A., and Ph.D. degree programs. International students should read the information contained in the International Applicants section of the Graduate Admission Application.

Jenny Lang, D.M.A.
Assistant Director for Admissions
2110 Clarice Smith Performing Arts Center
8270 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8435
Fax: 301.314.9504
Email: musicadmissions@umd.edu

Enrollment Services Coordinator
2110 Clarice Smith Performing Arts Center
8270 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5560
Fax: 301.314.9504
Email: musicadmissions@umd.edu

Website: http://www.music.umd.edu

Courses: MUED MUET MUSC MUSP

Admissions
General Requirements

- Statement of Purpose and Letters of Recommendation: The statement of purpose and three letters of recommendation will be required to be uploaded in the Supplementary Application (Acceptd), not the Graduate School's application.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Graduate Record Examination (GRE)
- Supplementary Application (https://app.getacceptd.com/umdmusic)

Admission to the graduate degree programs in music is highly selective. It is determined primarily by a performance audition, tapes and scores of original compositions, scholarly research papers, letters of recommendation, and/or successful teaching experience. All non-native English-speaking students must achieve a score of 575/233/100 on the TOEFL to be invited for audition/admission (see the School of Music's admission website (http://www.music.umd.edu/prospective_students/application_materials/#international) for detailed English language requirements).

We require a passing TOEFL score (minimum 100 IBT, 233 CBT, 575 PBT) for all applicants whose primary language is not English before we will process your application or consider you for a live audition. The requirement will be waived for applicants who have earned an undergraduate degree from an institituion in the United States or another approved English-speaking country. Waivers will only be granted if at least three years of the undergraduate education or at least two years of the graduate education in a non-performance related field took place at an English-speaking institution. Graduate degrees in performance-related fields or performance certificates or diplomas will not exempt an applicant from submitting a passing TOEFL score.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	1 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	1 Dec

Other Deadlines: Please visit the program website at http://www.music.umd.edu

Requirements

- Ethnomusicology, Doctor of Philosophy (Ph.D.) (p. 198)
- Ethnomusicology, Master of Arts (M.A.) (p. 197)

Facilities and Special Resources

With approximately 300 public performances each year—including student recitals and more than thirty ensembles—School of Music students have robust performance opportunities The School of Music also hosts numerous guest clinicians each year and presents the Renegade Series, which brings to campus some of the most visionary artists in our field. As one of the nation's leading public research universities, the University of Maryland provides a wealth of opportunities to learn from and collaborate with scholars in a variety of disciplines. The School of Music makes its home in the Clarice Smith Performing Arts Center, which serves as an inter-disciplinary laboratory for the arts. The building's six performance halls, the Michelle Smith Performing Arts Library, specialized rehearsal rooms, and classrooms provide students with all the resources needed to become twenty-first century artist-citizens. The Clarice's presenting arm provides School of Music students with the opportunity to collaborate and learn from internationally recognized artists and scholars. Recent artists-in-residence have included the St. Lawrence String Quartet, the Cappella Pratensis, Etienne Charles, Tine Thing Helseth, Jeremy Denk, and Dawn Upshaw. The Michelle Smith Performing Arts Library (MSPAL) ranks among the top twenty university music libraries in the United States, and it offers a variety of archives, special collections, and other research resources that give it international stature among scholars in a broad spectrum of music disciplines. The total music collection includes approximately 50,000 books, 150,000 scores, 140,000 recordings, and 4,500 linear feet of archival materials. The International Piano Archives at Maryland (IPAM) is the only institutional collection in existence devoted to historic piano performance. IPAM contains 40,000 recordings, 8,500 music scores, 2,500 books, and a collection of reproducing pianos with 8,000 piano rolls. To date, IPAM has acquired the collections of more than 40 eminent pianists. The MSPAL Special Collections in Performing Arts embrace a growing number of national and international music organization archives representing music education, band history, solo and ensemble instrumental performance, music librarianship, and ethnomusicology. Materials in these archives include papers, music scores, recordings, books, magazines, photographs, and oral histories. MSPAL also features important archival and manuscript collections on music criticism and American music, the Charles Fowler Papers supporting the study of arts education, a significant Leopold Stokowski Collection, the Jacob Coopersmith Collection of Handeliana, the Radio Station WOR/Alfred Wallen stein Collection of 26,000 orchestral scores, and the performance parts of the Andre Kostelanetz Orchestra.

The surrounding DC-Baltimore region offers a host of community engagement opportunities. Our students can often be seen performing at major venues such as The John F. Kennedy Center for the Performing Arts, Strathmore Hall and the Phillips Collection. We also present at intimate community spaces such as Riversdale Mansion and the historical Greenbelt Theatre. Within a few miles of our home in College Park are research opportunities offered by Dumbarton Oaks, the Enoch Pratt Free Library of Baltimore, the Folger Shakespeare Library, the Library of Congress, the National Archives, the Smithsonian Institution, and many other specialized libraries.

Executive Public Policy, Master of Public Management (M.P.M.)

Non-thesis only: 30 credits required

The Executive Master of Public Management (EMPM/EXPM) program is for professionals with at least 5 years of policy and/or management

experience. It consists of 30 credits of prescribed courses in the arts of public management and policy analysis. Students move through the program as members of a cohort at a designated site, either off-campus or on-campus on alternating weekends (Friday evenings/Saturday days).

Additional information on the curriculum and admissions policies of this program is available on the School's website.

Course	Title	Credits
Required courses:		
PLCY711	Public Management and Leadership	3
PLCY692	Leadership Principles and Practices	3
PLCY650	Moral Dimensions of Public Policy	3
PLCY670	Public Budgeting & Financial Management	3
Electives		18
Total Credits		30

Executive Public Policy (EXPM)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

CONTACT

Office of Student Affairs
2101 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	29 Jun	17 Jan
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Executive Public Policy, Master of Public Management (M.P.M.) (p. 199)

Family Science, Master of Science (M.S.)

Students interested in the M.S. degree should see the Couple and Family Therapy (p. 145) program page.

The CFT curriculum has three parts: didactic coursework, clinical practica, and supervised client contact. The minimum total credits required are 51 for the non-thesis option.

Supervised client contact begins in the student's first semester. Clinical students are required to gain 400 hours of face-to-face client contact, and 250 of these hours must be relational (with couples or families). The Center for Healthy Families, the couple and family therapy clinic operated by the Department, offers the opportunity to gain these hours. Clinical students receive 100 hours of supervision, both individual and group, for their client contact hours. Supervision in the Department's clinic is provided through a range of techniques including case discussion, one-way mirror observation, video review, co-therapy, and telephone consultation during live sessions. Students may choose to do some of

their clinical work in a variety of available externship sites in the local area.

Family Science, Doctor of Philosophy (Ph.D.)

Doctoral students must complete 52 credits beyond the master's degree. Students must also complete a research internship, pass a qualifying exam, and complete a dissertation and oral defense.

All Ph.D. students must complete foundation coursework required for a master's degree in Family Science. At the discretion of the Department's Graduate Committee, students entering the Ph.D. program with a master's degree in a related discipline may make up deficiencies in coursework through classes taken at the beginning of the program. Ph.D. students must also pass a qualifying examination and complete a dissertation and oral defense.

Students admitted full-time to the Ph.D. program post-master's can complete this program within three years. Students with only a baccalaureate degree have the option of applying as a dual degree candidate (master's in Couple and Family Therapy, and doctorate in Family Science) requesting admission to both programs simultaneously.

Course	Title	Credits
Required courses:		
FMSC760	Legal Issues & Families	3
FMSC606	Ethnic Families and Health Disparities	3
or FMSC745	Gender and Ethnicity in Family Therapy and Service Delivery	
FMSC660	Program Planning and Evaluation in Family Science	3
FMSC750	Family and Health Policy	3
SPHL600	Foundations of Public Health	3
FMSC780	Qualitative Methods in Family and Health Research	3
SPHL602	Foundations of Epidemiology and Biostatistics	4
EPIB651	Applied Regression Analysis	3
FMSC850	Maternal & Child Health Epidemiology	3
FMSC810	Theory in Family Systems and Family Health	3
FMSC689	Research Internship	3
Electives approved by Graduate Director		6
Doctoral Dissertation Research Requirements		
FMSC899	Doctoral Dissertation Research	12
Total Credits		52

Family Science (FMSC)

Graduate Degree Program
College: Public Health

Abstract

The Doctor of Philosophy (Ph.D.) program in Family Science provides an interdisciplinary, research-oriented approach to the discovery and application of knowledge about families. This exciting program examines both internal family processes and the dynamic interaction of families with the biological, psychological, social, political, and economic aspects of their environment. Graduates are prepared for a number of careers in the public, non-profit, and private sectors, including university teaching, research, family policy analysis, and administrative positions in human service programs.

The Ph.D. program adopts an ecological or systems approach to the study of families and the problems they face in today's society. The program of study provides doctoral students with a broad knowledge of family theory, research methodology, family policy, family programs, ethnic families, and major issues confronting contemporary families. Students also learn to design, implement, and evaluate culturally-sensitive interventions addressing family needs and to analyze the consequences of public/private policies on family well-being.

Students applying to the PhD program in Family Science should have a Master's degree in Family Science or a related behavioral or social science. It is possible for a limited number of students to be accepted into the Family Science Ph.D. program with only a Bachelor's degree, but they must complete a Master of Science (M.S.) degree in Couple and Family Therapy en route to the Ph.D. MCH applicants must have a Master's Degree in Public Health (MPH) or a Master's in applied behavioral or biological science. MCH students must complete missing MPH core courses (biostatistics, epidemiology, environmental health sciences, health services administration, and health behavior) within one academic year of program entry.

The Department of Family Science prepares students to describe, explain, and improve the quality of family life through applied research, education, therapy, human services, policy analysis, and advocacy. The approach is interdisciplinary, emphasizing individual, interpersonal, and social change. The program of study is based on a system or ecological paradigm, combining the perspectives of interrelated professional fields including family science, couple and family therapy, maternal and child health, family policy, behavioral science, and human services. Graduates are prepared for careers in the public, non-profit and private sectors, including university teaching, research, family policy analysis, and administrative positions in human service and public health programs.

Financial Assistance

Fellowships and Graduate Assistantships are available to students admitted into the Family Science Ph.D. program.

Contact

Kevin Roy, Ph.D.
Director of Graduate Studies
Department of Family Science
1142 School of Public Health Building
4200 Valley Drive
College Park, MD 20742
Telephone: 301.405.3672
Fax: 301.314.9161
Email: kroy@umd.edu

Website: http://www.sph.umd.edu

Courses: CCJS EDMS EPIB FMSC PUAF

Relationships: Epidemiology (EPID) (p. 196) Psychology (PSYC) (p. 340) Sociology (SOCY) (p. 375)

Admissions

The Family Science Ph.D. program considers applications from students with a Master's or Bachelor's degree in family science, public health, or a related discipline. Students admitted to the Ph.D. program in Family Science with a baccalaureate degree must complete the M.S. in Couple and Family Therapy with a thesis en route to the Ph.D.

The Department seeks students who are imaginative, intelligent, and highly motivated men and women with a desire for challenge, a commitment to excellence, and a well-developed sense of social responsibility. Most applicants have degrees in the applied behavioral or social sciences. However, the Department invites application from those in non-allied fields who have a proven record of occupational and/or volunteer experience in the family field. We are fortunate to attract gifted students who are concerned about social and ethical issues and who view their future profession in a broad context.

Students are selected on the basis of:

- performance in previous undergraduate and/or graduate coursework
- the strength of GRE scores taken within the last five years
- letters of recommendation
- quality of the empirical Master's Thesis (for those with a Master's degree)
- relevant work experience
- professional goals congruent with those of the program

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	14 Dec

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Family Science, Doctor of Philosophy (Ph.D.) (p. 201)
- Family Science, Master of Science (M.S.) (p. 200)

Facilities and Special Resources

The University's close proximity to the nation's capital, the state capital in Annapolis, federal executive departments, and headquarters of national professional and public interest associations provide research and internship placements for studying family policy unmatched by any other graduate program in the discipline. The Washington-Baltimore metropolitan area offers rich opportunities for research on culturally and socioeconomically diverse families. The campus and department have excellent computer facilities. Students have ready access to the University's extensive library systems, as well as holdings from the Library of Congress, the National Institutes of Health, National Library of Medicine, National Archives, and many other library collections.

Center for Healthy Families: This Center is the training and research arm of the Couple and Family Therapy Program in the Department of Family Science. Departmental graduate students and faculty provide clinical and educational services to families from surrounding communities in this state-of-the-art facility. Master's and doctoral students use data collected at the Center for research projects.

Finance, Master of Finance (M.Fin.)

Non-thesis only: 30 credits required

The Master of Finance program provides students with the knowledge and skills necessary to succeed in the complex and networked world of finance.

All students must complete the following core courses and complete an additional 18 credits in one of the four specializations. Specializations include Corporate Finance, Asset Management, Risk Management, and General Finance.

Course	Title	Credits
Required courses:		
BUSI640	Corporate Finance	2
BUFN740	Capital Markets	2
BUFN750	Valuation in Corporate Finance	2
BUFN758	Special Topics in Finance	4
BUFN761	Derivative Securities	2
Specialization courses		18
Total Credits		30

Finance (BMFN)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607

programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial aid is available to qualified full-time and Executive MBA students in the form of fellowships, graduate assistantships, and scholarships.

Contact

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Fax: 301.314.9862
Email: ms_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Courses: BMGT BUAC BUDT BUFN BULM BUMK BUMO BUSI

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/master-of-finance/admissions

MBA and MS Admissions Office: 301-405-2559
Executive MBA Admissions Office: 301-405-2386
Online MBA Admissions Information: 877-807-8741
PhD Admissions Office: 301-405-2214

Admission criteria for the Master of Finance are based on: quality of undergraduate and graduate coursework; GMAT or GRE score, 1 letter of recommendation; professional experience; video submission; and written essay of objectives. Prospective applicants may contact the program at (301) 405-2559 for information regarding this Masters program.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Finance, Master of Finance (M.Fin.) (p. 202)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Financial Risk Management, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
BUFN754	Corporate Risk Management	2
BUFN766	Financial Engineering	2
BUFN762	Fixed Income Analysis	2
BUFN772	Bank Management	2
BUFN758	Special Topics in Finance (BUFN758R - Financial Institution Risk Management)	2
Choose one of the following electives:		2
BUFN763	Portfolio Management	
BUFN764	Quantitative Investment Strategy	
BUFN765	Fixed Income Derivatives	
Total Credits		12

Financial Risk Management (Z122)

Graduate Certificate Program

College: Business

abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Fax: 301.314.9862
Email: ms_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/ms-accounting/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Admission criteria for the MS program focusing in accounting are based on: quality of undergraduate and graduate coursework; 1 letter of recommendation; professional experience; video submission; and written essay of objectives. Prospective applicants may contact the program at 301.405.2559 for information regarding the MS program.
Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Financial Risk Management, Post-Baccalaureate Certificate (P.B.C.) (p. 203)

Fire Protection Engineering, Master of Science (M.S.)

Thesis only: 30 credits

The Master of Science (M.S.) degree program requires a research thesis and completion of a minimum of 24 credit hours of approved courses. Individual coursework plans are determined by the student, his or her advisor and the department. The M.S. research thesis should make a contribution to the advancement in the state-of-the-art of fire safety science and/or engineering. In addition to a M.S. degree, the department also offers a Master of Engineering (M.Eng.) degree which requires 30 credit hours of approved courses in major and minor core areas. The M.Eng. degree does not include a research thesis. The department's degree requirements are given in detail in its graduate guide, see http://www.fpe.umd.edu/grad.

Students with a B.S. in UMD's FPE Program

Course	Title	Credits
ENFP799	Master's Thesis Research	6
Eight approved courses		24
Total Credits		30

Students without a B.S. in UMD's FPE Program

Course	Title	Credits
ENFP651	Advanced Fire Dynamics	3
ENFP799	Master's Thesis Research	6
Seven additional approved courses		21
Total Credits		30

Fire Protection Engineering (ENFP)

Graduate Degree Program
College: Engineering

Abstract

The Department of Fire Protection Engineering (FPE) offers a world-class environment for advanced graduate study and research in the broad area of fire safety. The department offers a Master of Science (M.S) degree and a Master of Engineering (M.Eng.) degree. The mission of the FPE Department is to reduce the burden of fire losses on life and property by providing the highest quality of scientifically-based education, research, and outreach in fire protection engineering, and in fire-related safety, health and environmental issues. The FPE graduate program provides the unique interdisciplinary academic foundation and scholarly training needed to address complex engineering problems with emphasis on advancing the field of fire protection engineering.

The educational objectives of the FPE M.S. and M.Eng degree programs are to produce graduates who:

- Have the technical knowledge and skills needed to practice fire protection engineering locally, nationally and internationally in a variety of modern professional settings;
- Have the ability to understand and communicate societal, environmental, economic and safety implications of engineering decisions on the local and global communities;
- Are prepared to participate in the development and promotion of fire protection engineering and assume technical and/or business leadership positions.

Some additional educational objectives specific to the FPE M.S. degree program are to produce graduates who:

- Appreciate the importance of scientific research as a mechanism to strengthen the technical basis of fire protection engineering.
- Have the basic competencies needed to pursue advanced studies (e.g., Ph.D.) in fire protection engineering or related fields.

The program is designed to stimulate intellectual growth, increase the level of objective understanding of the physical world and further develop capabilities for analysis and synthesis in order to produce premier fire safety engineers and/or researchers.

Financial Assistance

The Department of Fire Protection Engineering offers several types of financial support through various research or teaching assistantships. Students are also encouraged to seek other external funding opportunities, for instance via University of Maryland work-study programs and internships available in fire laboratories and FPE consulting companies in the Baltimore-Washington area. For more details, see the department's graduate guide available at http://www.fpe.umd.edu/grad.

Contact

Arnaud Trouvé
Professor and Director of Graduate Studies
Department of Fire Protection Engineering
3104D J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8209
Fax: 301.405.9383
Email: enfpgrad@deans.umd.edu

Website: http://www.enfp.umd.edu

Courses: ENFP

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

The M.S. and M.Eng. programs are open to qualified students holding a Bachelor of Science (B.S.) degree in engineering, or a related field from an accredited institution. Applicants should have taken the following 4 prerequisite courses: differential equations, fluid mechanics, heat transfer, structural mechanics (or strength of materials). Applicants who have not completed all prerequisites may still be admitted on a provisional basis if they demonstrate satisfactory academic performance in a related field and/or relevant work experience; these applicants may then be asked to complete the prerequisite courses during their first semester at the University of Maryland. In most cases, the application process requires scores from the Graduate Record Examination (GRE).

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	29 Jun	30 Nov
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.enfp.umd.edu

Requirements

- Fire Protection Engineering, Master of Science (M.S.) (p. 204)

Facilities and Special Resources

See http://www.fpe.umd.edu/research/labs for a description of the experimental and computer laboratories available in the Department of Fire Protection Engineering.

Fire Protection Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Students must complete Group A courses before completing Group B courses.

Course	Title	Credits
Group A: [1]		
ENFP625	Advanced Fire Modeling	3
ENFP655	Smoke Control	3
ENFP651	Advanced Fire Dynamics	3
ENFP652	Fire Assessment Methods	3
ENFP653	Advanced Fire Supression	3
Group B courses (complete five):		15
ENFP613	Human Response to Fire	
ENFP621	Analytical Procedures of Structural Fire Protection	
ENFP661	Forensic Fire Analysis	
ENFP662	Performance Based Design	
ENFP663	Advanced Fire Risk Modeling	
ENFP664	Advanced Industrial Fire Safety	
Total Credits		30

[1] Must be completed before completing Group B courses

Fire Protection Engineering (online) (ENGF)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Fire protection engineers are among the most sought-after professionals in the industry. Performance building codes and the international trend towards performance-based fire safety analysis and design approaches in construction have increased demand for fire protection engineers. The University of Maryland's fire protection engineering degree programs represent the Department of Fire Protection Engineering's commitment to preparing engineers for the challenges of this rapidly growing field. Fire protection engineering courses are available to explore basic processes of fire behavior, prediction of fire development, the combustion of materials and furnishings, the effects of fire on structures and the environment, smoke management, evacuation and tenability analysis and the law.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Office of Advanced Engineering Education
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University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/fire-protection.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for the full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education

admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Fire Protection Engineering, Master of Engineering (M.Eng.) (p. 206)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
ENFP627	Smoke Detection and Management	3
ENFP625	Advanced Fire Modeling	3
ENFP651	Advanced Fire Dynamics	3
ENFP653	Advanced Fire Supression	3
Total Credits		12

Fire Protection Engineering (online) (Z049)

Graduate Certificate Program

College: Engineering

ABSTRACT

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Fire protection engineers are among the most sought-after professionals in the industry. Performance building codes and the international trend towards performance-based fire safety analysis and design approaches in construction have increased demand for fire protection engineers. The University of Maryland's fire protection engineering degree programs represent the Department of Fire Protection Engineering's commitment to preparing engineers for the challenges of this rapidly growing field. Fire protection engineering courses are available to explore basic processes of fire behavior, prediction of fire development, the combustion of materials and furnishings, the effects of fire on structures and the environment, smoke management, evacuation and tenability analysis and the law.

FINANCIAL ASSISTANCE

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

CONTACT

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Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.oaee.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/fire-protection.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.oaee.umd.edu

Requirements

- Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 207)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Fire Protection Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

Students taking courses on campus for the Master of Engineering Degree work with an advisor to identify a course of study based on the student's professional interests. Students are required to complete 10 approved courses, including a minimum of six fire protection engineering core courses.

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Complete at least six of the following core courses:		18
ENFP415	Fire Dynamics	
ENFP425	Enclosure Fire Modeling	
ENFP611	Fire Induced Flows	
ENFP613	Human Response to Fire	
ENFP620	Fire Dynamics Laboratory	
ENFP621	Analytical Procedures of Structural Fire Protection	
ENFP622		
ENFP625	Advanced Fire Modeling	
ENFP627	Smoke Detection and Management	
Pre-approved elective options:		12
ENFP610		
ENFP612		
ENFP630	Diffusion Flames and Burning Rate Theory	
Total Credits		30

Fire Protection Engineering (PMFP)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Fire protection engineers are among the most sought-after professionals in the industry. Performance building codes and the international trend towards performance-based fire safety analysis and design approaches in construction have increased demand for fire protection engineers. The University of Maryland's fire protection engineering degree programs represent the Department of Fire Protection Engineering's commitment to preparing engineers for the challenges of this rapidly growing field. Fire protection engineering courses are available to explore basic processes of fire behavior, prediction of fire development, the combustion of materials and furnishings, the effects of fire on structures and the environment, smoke management, evacuation and tenability analysis and the law.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/fire-protection.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Fire Protection Engineering, Master of Engineering (M.Eng.) (p. 208)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

This program is also offered 100% online. Please see Fire Protection Engineering (ENGF) for more information.

Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Core Requirements		
ENFP651	Advanced Fire Dynamics	3
Three additonal approved ENFP courses at the 600 level		9
Total Credits		12

Fire Protection Engineering (Z059)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Fire protection engineers are among the most sought-after professionals in the industry. Performance building codes and the international trend towards performance-based fire safety analysis and design approaches in construction have increased demand for fire protection engineers. The

University of Maryland's fire protection engineering degree programs represent the Department of Fire Protection Engineering's commitment to preparing engineers for the challenges of this rapidly growing field. Fire protection engineering courses are available to explore basic processes of fire behavior, prediction of fire development, the combustion of materials and furnishings, the effects of fire on structures and the environment, smoke management, evacuation and tenability analysis and the law.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

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Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/fire-protection.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for the online programs (https://gradschool.umd.edu/engineering/cert-online) or full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 209)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

This program is also offered 100% online. Please see Fire Protection Engineering (Z049) for more information.

Food Safety Risk Assessment, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Food Safety Risk Assessment (Z027)

Graduate Certificate Program
College: Agriculture and Natural Resources

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.risk.jifsan.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.risk.jifsan.umd.edu

Requirements

- Food Safety Risk Assessment, Post-Baccalaureate Certificate (P.B.C.) (p. 210)

French Modern Studies, Doctor of Philosophy (Ph.D.)

All doctoral students are required to complete 24 credits beyond the M.A. in addition to 12 credits of FREN899. Students must also demonstrate reading knowledge of one other foreign language in addition to French.

Ph.D. students are required to take for credit a minimum of 8 courses beyond the M.A. at the 600-level or above. They are also required to pass two Qualifying Examinations consisting of a two-part Comprehensive Examination (first written, then oral, taken over two consecutive days by the end of the third semester in the PhD program) and the defense of a written Dissertation Prospectus (scheduled by the end of the fourth semester in the PhD program) before being advanced to candidacy. Ph.D. candidates then go on to write and defend a dissertation that explores significant questions about French-language literature and culture, past or present, hexagonal or extra-hexagonal.

All Ph.D. students are required to demonstrate a sound reading knowledge of one other foreign language in addition to French. A student having a recognized degree or diploma in a subsidiary area such as Music, Economics, Political Science, etc, and who plans to make substantial use of this body of knowledge for the dissertation may be permitted, with the approval of the Graduate Programs Committee, to substitute such degree or diploma for the additional foreign language requirement.

All requirements for the Ph.D. degree, except the dissertation, must be completed within five years of admission to the program. The dissertation must be completed no more than four years after advancement to candidacy. (See department website f (http://sllc.umd.edu/french/graduate)or additional information)

Course	Title	Credits
History of Ideas course		3
Issues in Literature course		3
History of the French Language course		3
Remainder of coursework		15
Teaching Assistants must complete the following:		
FREN709	College Teaching of French	
FREN611	The Structure of the French Language	
Dissertation Research Requirements		
FREN899	Doctoral Dissertation Research	12
Total Credits		36

Modern French Studies (FRMS)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Ph.D. in French Modern Studies encompasses the Renaissance to the present. The diversity of the Graduate Faculty makes it possible for students to specialize in a wide variety of areas in French language, literature, film, and culture. The Department is part of a larger School of Languages, Literatures and Cultures that encourages and facilitates interdisciplinary scholarship, particularly in Film Studies and in Cultural Studies. Through consortia arrangements with universities in the area, including George Washington University and Georgetown University, students may augment their programs with courses otherwise unavailable at the University of Maryland.

Financial Assistance

Graduate applicants can request to be considered for Teaching Assistantships and Graduate Fellowships. Graduate Teaching Assistantships carry ten-month stipends for a total of four years (provided that the student remains in good standing), plus remission of all fees (10 credits) other than those for registration and health facilities.

Contact

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University of Maryland
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Telephone: 301.405.4029
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Email: ceades@umd.edu

Website: http://www.sllc.umd.edu

Courses: FREN

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample

All applicants are automatically considered for departmental Fellowships and Teaching Assistantships.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	16 Jan	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	16 Jan	28 Sep

Other Deadlines: Please visit the program website at http://www.sllc.umd.edu

Requirements

- French Modern Studies, Doctor of Philosophy (Ph.D.) (p. 211)

Facilities and Special Resources

With a total student enrollment of over 35,000, the University of Maryland is supported in its academic endeavors by the University Libraries, a system of eight libraries and more than three million volumes. Other area research facilities include two of the worlds outstanding libraries: the Library of Congress and the Folger Library, both of which have extensive holdings in French. The School of Languages, Literatures and Cultures, the Women's Studies Program, and the David C. Driskell Center For The Study of The Visual Arts and Culture of African Americans and The African Diaspora, among other campus units, offer seminars, lectures, and symposia on a wide variety of topics relevant to graduate students in French.

French Studies, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

The M.A. without thesis requires a minimum of 30 credits, of which at least 18 must be selected from courses numbered 600 or above. In lieu of a thesis, students must present a Qualifying Paper of between 25 and 30 pages in length as evidence of their ability to do independent research. The M.A. with thesis requires a minimum of 24 credits, of which not less than 12 must be selected from courses numbered 600 or above. A further six credits (thesis research/FREN799) are required. The M.A. thesis committee consists of 2 faculty members in addition to the student's thesis director, who serves as chairperson. There is an oral examination on the thesis, which should be a minimum of 80 pages in length. (See department website (http://sllc.umd.edu/french) for complete information)

Teaching Assistant Requirement

All Teaching Assistants are required to take SLLC601 for one credit. This course counts towards the total credits required.

Course	Title	Credits
Theory or history of ideas course		3
French linguistics course		3
Three culture/literature courses from three different periods		9
Thesis or Non-thesis options:		15
Thesis Option:		
French studies courses		
FREN799	Master's Thesis Research	
Non-thesis option:		
French studies courses		
Qualifying Paper		
Total Credits		30

French Studies (FRIT)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of French and Italian prepares students for the Master of Arts (FRIT) and Doctor of Philosophy (FRMS) degrees in French language, literature and culture. The research interests of the graduate faculty span the Renaissance to the present. For the doctoral program, consult the graduate catalog under FRMS, "Modern French Studies."

Financial Assistance

Graduate applicants can request to be considered for Teaching Assistantships and Graduate Fellowships. Graduate Teaching Assistantships carry ten-month stipends for two years, plus remission of all fees (10 credits) other than those for registration and health facilities.

Contact

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Email: ceades@umd.edu

Website: http://www.sllc.umd.edu

Courses: FREN

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample

All applicants are automatically considered for departmental Fellowships and Teaching Assistantships.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	16 Jan	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	16 Jan	28 Sep

Other Deadlines: Please visit the program website at http://www.sllc.umd.edu

Requirements

- French Studies, Master of Arts (M.A.) (p. 212)

Facilities and Special Resources

With a total student enrollment of over 35,000, the University of Maryland is supported in its academic endeavors by the University Libraries, a system of eight libraries and more than three million volumes. Other area research facilities include two of the world's outstanding libraries: the Library of Congress and the Folger Library, both of which have extensive holdings in French. The School of Languages, Literatures and Cultures, the Women's Studies Program, and the David C. Driskell Center For The Study of The Visual Arts and Culture of African Americans and The African Diaspora, among other campus units, offer seminars, lectures, and symposia on a wide variety of topics relevant to graduate students in French.

Geographical Science, Master of Science (M.S.)

Non-thesis only: 30 credits required

Students are also required to complete a scholarly project.

The combined BS/MS degree is only granted to students who have successfully completed the 120 hours of undergraduate coursework, 30 hours of graduate coursework, and a scholarly paper. For more information in the course sequencing and credits applicable to both the undergraduate and graduate degrees, see the Department's website: http://geog.umd.edu/combined-bsms-program.

Course	Title	Credits
Required courses:		
GEOG601		3
GEOG606	Quantitative Spatial Analysis	3
GEOG789	Independent Readings	6
GEOG798	Selected Topics in Geography: Seminar Series	3
GEOG6xx: Technical Elective		3
GEOG6xx: Physical Elective		3
GEOG6xx: Human Elective		3
GEOG6xx: Electives		6
Total Credits		30

Geographical Sciences, Doctor of Philosophy (Ph.D.)

For those entering with a Master's degree in Geography, the PhD should be completed withing 4 years; For those entering with Bachelor's or without a Geography background, the PhD should be completed within 5 years. Part-time study takes longer, but at least 1 year full-time attendance is required. Students entering with a B.A. or without a Geography background will take one course each in the following areas: Human, Physical, and Methods. See the PhD Handbook (https://geog.umd.edu/graduate/phdhandbooks) for further details.

Doctoral students are required to complete a set of coursework and dissertation research. In addition, students must pass a portfolio assessment. Students without a Geography background should complete an additional 9 credits in the following areas:

- Environmental and Biological Aspects of Earth Systems Science,
- Human Dimensions of Global Change, and
- Geospatial Information Sciences.

Course	Title	Credits
Required courses:		
GEOG601		3
GEOG606	Quantitative Spatial Analysis	3
or GEOG636	Qualitative Methods in Geography	
GEOG608	Comprehensive Portfolio Assessment Summary	1-3
GEOG788	Selected Topics in Geography (GEOG788D - Selected Topics in Geography)	3
GEOG798	Selected Topics in Geography: Seminar Series	2
Pass a portfolio assessment		
Dissertation Research Requirements		
GEOG899	Doctoral Dissertation Research	12
Total Credits		24-26

Geographical Sciences (GEOG)

Graduate Degree Program

College: Behavioral and Social Sciences

Abstract

The Department of Geographical Sciences offers graduate study leading to the Doctor of Philosophy, Master of Professional Studies in Geospatial Information Sciences, and five year, combined Bachelors of Science and Masters of Science in Geographical Sciences degrees.

The specific research specializations represented by the faculty include:

Human Dimensions of Global Change

Coupled Human and Natural Systems. The Department's ultimate research goal is to advance an integrated understanding of the coupled Earth system including spatially distributed human processes. Our research addresses both fundamental and applied issues in coupled human and natural systems, such as population, socio-economic development, consumption and production, poverty, climate impacts and adaptation, vulnerability and mitigation, as well as the examination of policy options and trade-offs on sustainability. Our scientists investigate both the human socio-economic system and the climate system, and their linkages.

Land Cover, Land Use Change

Land cover and land-use change is a key interface between human and natural systems. Our scientists are world leaders in the remote sensing of land-cover changes. This information is actively combined with human socio-economic data to study past land cover and land use change and to inform advanced modeling of spatially-explicit future scenarios. These methods are actively being used to simultaneously address social, economic, carbon, climate, biodiversity and other aspects of land-use changes. We develop agricultural monitoring systems and look at societal impacts, adaptions and vulnerability to fire, droughts, floods, desertification, and other catastrophic events.

Geospatial Information Sciences and Remote Sensing

Collecting and interpreting geospatial data is central to everything we do as geographers, whether on computers or in the field. From local events to multi-scale processes, our faculty are developing and applying advanced remote sensing capabilities and GI Science that will help us to develop the next generation of GI technologies and understanding of the world's geography. Our strengths include advanced computer modeling, scientific and geographic visualization, sensor calibration and design, image processing, geocomputing, spatial statistics, and semantic learning.

Carbon, Vegetation Dynamics and Landscape-scale Processes

The department carries out a broad array of research focused on monitoring vegetation dynamics, with a particular focus on mapping and studying human and natural disturbances and their landscape-scale impacts, as well as changes to the earth surface as a result of climate variability. This research involves integration of field-based research with remotely-sensed observations to address key scientific uncertainties. Alterations to the global carbon cycle are changing atmospheric composition and climate with implications for human well-being and a particular focus of our research is on monitoring and modeling the terrestrial carbon cycle with unprecedented sophistication and resolution.

The Department contains several specialized groups, including the Global Land Cover Facility, as well as several smaller groupings of research interests. The Department also has close ties with cross-campus research initiatives, including the Earth Systems Science Interdisciplinary Center (ESSIC) and the Joint Global Change Research Institute (JGCRI). ESSIC is an initiative that brings together the Departments of Geography, Geology and Atmosphere and Ocean Science in a Research Institute to further encourage interdisciplinary studies to address contemporary questions in Earth Systems Science. JCGRI is a collaboration between the University of Maryland and the Pacific Northwest National Laboratory and is dedicated to understanding the problems of global climate change and their potential solutions.

Financial Assistance

Teaching Assistantships, Research Assistantships, and various Fellowships are available. Salary is for 9.5 months per year. Assistants work 20 hours per week. Fellowship recipients have no work assignment. Depending upon resources, the department will provide up to four years of funding, provided the student meets the department's benchmarks (see the PhD Handbook (https://geog.umd.edu/graduate/phdhandbooks)). Applications are made on the University Graduate Admission Application and further information about Financial Aid is given in the Application. Note, residents of certain Southern States without equivalent Geography graduate programs may be eligible to receive tuition at the lower, in-state fee rates.

Funding is not available for students in the combined BS/MS program.

Fellowships in Support of Diversity and Inclusion (https://geog.umd.edu/graduate/assistantships) (optional)

Contact

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Website: http://www.geog.umd.edu

Courses: GEOG

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationgeog.pdf)
- Supplementary Application Two (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationgeog2.pdf)
- CV/Resume

- Publications/Presentations
- Writing Sample

The Department offers courses of study leading to the Ph.D. degree and the MPS (masters in professional studies in geospatial information sciences). The MPS program is administered separately and has different admission deadlines and requirements than the Ph.D. program. See the MPS GIS Program (https://geog.umd.edu/landing/Graduate). The Department no longer offers an M.A. option. All students are admitted directly to the Ph.D. program.

Ph.D. Program

The Department admits students to our doctoral program that have already completed a masters degree and exceptionally well qualified students who have only completed a bachelor's degree. Admitted students are required to either possess or shall develop a strong foundation in the discipline of Geography. Admission to the Ph.D. program is not limited to students with a Geography degree. Those with degrees in related disciplines such as environmental, physical or biological sciences, anthropology, economics, history and social science are encouraged to apply but may be required to undertake additional background study. Some knowledge of data processing and statistics is necessary for all applicants.

Applicants proposed program of study must clearly draw on the research strengths of existing faculty members. All applicants are strongly encouraged to contact individual faculty members (in person, by phone, or by email) to discuss their research interests and to identify potential advisors, as they will need a faculty to sponsor them for admission.

In general, the Department admits between 10-15 students each year into the Ph.D. program. Virtually all students accepted are fully-funded through assistantships and fellowships. While there is no longer a formal M.S. program, a terminal masters degree may be received for qualified students who are unable to complete the Ph.D. program.

Combined BS/MS Program

The Masters of Science degree is only earned through the Department's combined five year BS/MS program. The combined BS/MS program enables some of the better performing students pursuing an undergraduate Geographical Sciences major to earn both their BS and their MS in five years by counting up to 8 credits of their Geographical Sciences graduate courses towards both degrees, thus significantly reducing both the time and cost of earning both degrees.

Most students apply to the program at the end of their Junior year to begin graduate courses and be part of the program as of their Senior year. Admission into the program is strongly competitive. Students will be admitted with an undergraduate degree in Geographical Sciences, including those with an ENSP concentration in Geographical Sciences. Minimum requirements are: 3.5 GPA overall, three letters of recommendation, and a statement of research.

Applicants' proposed statement of research must clearly align with the research strengths of existing faculty members. All applicants are strongly encouraged to contact individual faculty members (in person, by phone, or by email) to discuss their research interests and to identify potential advisors, as they will need a faculty member to sponsor them for admission.

In general, the Department admits between 5-10 students each year into the combined BS/MS program. There is no Departmental funding available.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	14 Dec

Other Deadlines: Please visit the program website at http://www.geog.umd.edu

Requirements

- Geographical Science, Master of Science (M.S.) (p. 213)
- Geographical Sciences, Doctor of Philosophy (Ph.D.) (p. 213)

Facilities and Special Resources

The Washington, D.C. metropolitan area is an exceptional location in which to pursue geographic research. Many national and international agencies are within a short distance of the campus, including the NASA Goddard Space Flight Center, the USDA Beltsville Agricultural Research Center, the National Archives, Bureau of the Census, National Institutes of Health, USGS, National Geospatial Imaging Agency, Smithsonian Institution, and NOAA. International and non-governmental agencies are located within easy reach, including the National Geographic Society, the Nature Conservancy, World Wildlife Fund, World Bank, and many others. Corporations, businesses and nonprofit organizations that use geographical applications are also well represented. Libraries on campus and nearby are unrivaled elsewhere in the world. The University is also located in a region of extraordinary geographic diversity, including two major urban centers (Baltimore and Washington, D.C.), and the superb, continuous section from the Appalachian mountains, through the Piedmont, Coastal Plain, and Chesapeake Bay to the Atlantic Coast.

Many opportunities exist for students to participate in externally funded research projects. Graduate students find these research programs a rich source of ideas for dissertations as well as providing opportunities to join projects as paid research assistants and, often, identifying openings for employment on completion of their studies.

The Department is housed in over 35,000 sq. ft. on the main College Park campus. Teaching laboratories include facilities for cartography, GIS, and the Turner laboratories dedicated to computer-based instruction, while other facilities needed for virtually any type of investigation are available through collaborations with other departments. There are two primary computer environments, namely PC and UNIX, with over 100 machines dedicated to teaching and graduate research. The research laboratories support UNIX, Linux, and high-end PC machines, including very high performance processors and peripherals and large volume RAID arrays. There are a large number of printers, magnetic disk farms, tape libraries, etc. An extensive range of software is available, including satellite data processing, image analysis, and ESRI GIS packages. Field research, remote sensing, global positioning systems, and other types of equipment are available.

Geology, Master of Science (M.S.)

Thesis only: 30 credits

Students are required to complete 30 credits, including at least 18 credits from the Department of Geology and at least 12 credits at the 600 level or higher.

The Department of Geology offers a Master of Science degree. There is no single prescribed curriculum. Although 24 credit hours of course work and 6 credit hours of thesis research are required, the entire course of study is individually developed for each student by his/her graduate program committee as approved by the Director of Graduate Studies. The M.S. degree is awarded following the successful completion of the course requirements, defense of a proposal, submission of a satisfactory thesis, and an oral defense of the thesis. The M.S. normally requires two years of work.

Course	Title	Credits
Coursework including at least 18 credits from the Department of Geology and at least 12 credits at the 600 level or higher		24
GEOL799	Master's Thesis Research	6
Total Credits		30

Geology, Doctor of Philosophy (Ph.D.)

Students who have an M.S. degree must normally complete a minimum of 12 credits of coursework applicable to a graduate degree with at least 9 credits at the 600 level or above. Coursework requirements for students who do not hold an M.S. degree will be established by the Director of Graduate Studies after discussion with the student's advisor but normally will be 30 credits of coursework applicable to a graduate degree, 21 of which must be at the 600 level or above, and normally 24 credits must be from the Department of Geology, or in the case of an interdisciplinary study, an appropriate program approved by the Director of Graduate Studies. The Ph.D. degree requirements include satisfactory completion of course work, defense of a research proposal, an oral candidacy and research proposal examination, and a successful dissertation defense. The Ph.D. commonly requires three to four years of work, if conducted after the completion of an M.S. program, or four to five years from the time of admission if pursued directly from the bachelor level.

Entering with an M.S. Degree

Course	Title	Credits
Select 12 credits of coursework with at least nine credits at the 600 level or above.		12
Dissertation Research Requirement		
GEOL899	Doctoral Dissertation Research	12
Total Credits		24

Entering without an M.S. Degree

Course	Title	Credits
Select 30 credits of coursework with at least 21 credits at the 600 level or above.		30
Dissertation Research Requirement		
GEOL899	Doctoral Dissertation Research	12
Total Credits		42

Geology (GEOL)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Department of Geology offers programs leading to the M.S. and Ph.D. degrees. On a full time basis, the M.S. normally requires two to three years of work, which includes courses, the completion of an M.S. research thesis, and an oral defense of the thesis. On a full time basis, the Ph.D. commonly requires three to four years of work, if conducted after the completion of an M.S. program, or four to five years from the time of admission if pursued directly from the Bachelor level. The Ph.D. program normally includes course work, a qualifying examination and proposal defense, a dissertation, and an oral defense and examination of the dissertation.

Our students are required to engage in independent and original research under a mentoring program that promotes creative thinking. This is most commonly achieved via the collaboration between students and faculty in ongoing research programs. Geology is concerned with the Earth, its origin and evolution and the origin of life, and the processes by which Earth's atmosphere, surface and interior have been and continue to be modified. To pursue these topics we have developed research strengths in four themes: Geochemistry, which involves investigations of low- to high-temperature processes operating from Earth's surface to it's core and within the Solar System; Solid Earth Science, which is the study of the minerals, rocks, and structures that constitute Earth, and the tectonic and other processes by which they are formed and altered; Surficial Processes and Environments, which involves the study of active and past fluxes (and reservoirs) of water, dissolved components, and sediment on Earth's surface and the interactions of these fluxes with the biosphere and atmosphere; and, Geophysics, which includes investigations of Earth's interior structure and dynamics, as well as planetary physics. These areas are not mutually exclusive, and students are encouraged to develop a program that suits their interests. Developing areas within the Department include planetary geology and forensics.

Although students will choose an advisor within the Department of Geology, they may also wish to take advantage of research opportunities provided by collaboration with other departments on campus, such as Mathematics, particularly the Applied Mathematics and Scientific Computation Program (AMSC), Atmospheric and Oceanic Science, Physics, Geography, and Chemistry, as well as other institutions in the area including the Smithsonian Institution, United States Geological Survey, NASA, Department of Terrestrial Magnetism, Geophysical Lab and National Institute of Standards and Technology. The Earth System Science Interdisciplinary Center is a collaborative venture between the Departments of Geography, Geology and Atmospheric and Ocean Science on Campus, and the Earth Sciences Directorate at NASA Goddard. This wealth of in-house and collaborative resources positions our graduate students with an unmatched spectrum of opportunities and gives them access to a strong multi-disciplinary program of international stature.

Our current student demographics are diverse, with an approximate 50:50 mix of male and female students of which 10-20% are minority students. Approximately 60% of our graduate students are Ph.D. candidates (the remaining are M.S. students), and some of the M.S. students will petition to become Ph.D. candidates following the successful completion of their M.S. degree program. Other M.S. candidates are focused solely

on the M.S. degree, which is the commonly held degree for practicing professionals in government and industry.

Our graduate students benefit from the opportunities of working within an advanced graduate program. Our graduates go on to distinguished post-doc, research and applied positions in academic, government and industrial settings. We proudly acknowledge having placed our students into prestigious post-doc positions and government laboratories and we highlight their publications (see https://www.geol.umd.edu/graduate/gradpubs.php), presentations at national and international meetings (see https://www.geol.umd.edu/graduate/gradpresentations.php) and awards (see https://www.geol.umd.edu/graduate/gradfunding.php).

Financial Assistance

Graduate students are eligible for Departmental teaching assistantships, Graduate School fellowships and grant-supported fellowships and research assistantships. In addition, some curatorial, library and other part-time work is sometimes available.

Contact

See the Department of Geology Web page at URL http://www.geol.umd.edu for additional information. The Department's Graduate Studies in Geological Sciences also provides additional information on the requirements, examinations, faculty research interests and publications, research facilities and financial aid. Copies are available from:

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Website: http://www.geol.umd.edu

Courses: GEOL

Keyword: Structural, geochemical, and petrologic investigations of tectonic and metamorphic processes; mechanisms of sediment transport; sedimentary cycling; surface, near-surface, and deep-crustal fluid flow; laboratory, geochemical and field studies of magmatic and ore-forming processes; and geochemical investigations of early solar system evolution

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)

Qualified students with a B.S. degree in geology, physics, mathematics, chemistry, biology, engineering or other related sciences are invited to apply for admission to the graduate programs. Our graduate degree program in geophysics welcomes students with undergraduate degrees in physics and or astronomy having little to no background in geology. Coursework expectations for students applying to the program is at least a year of calculus, a semester of physics for science majors, and for those in the in geology and geochemistry track a year of chemistry or its equivalent. All students must submit the Graduate Record Examination scores to be considered for admission.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	4 Jan	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	4 Jan	28 Sep

Other Deadlines: Please visit the program website at http://www.geol.umd.edu

Requirements

- Geology, Doctor of Philosophy (Ph.D.) (p. 216)
- Geology, Master of Science (M.S.) (p. 216)

Facilities and Special Resources

The Department maintains a suite of state-of-the-art facilities and equipment for research, including: three solid source mass spectrometers, six gas source mass spectrometers, with inlet devices for inorganic and organic isotope analyses, single and multicollector inductively-coupled plasma mass spectrometers (ICP-MS), three UV lasers for in situ analyses with gas-source and plasma mass spectrometer, two chemical clean labs, with ion chromatographic facilities, JEOL 8900 superprobe with an Oxford instrument mini-cathodoluminescence detector, Scanning and Transmission Electron Microscopes, color image analysis system, fluid inclusion stage, high temperature and high pressure equipment for dry or hydrothermal experiments, diamond anvil cell facilities, including laser heating and external heating, two triaxial deformation apparatii with flow through capacity and acoustic emission recording, flame and graphite furnace atomic absorption equipment, spectrophotometers, HPLC with fluorescence detector, UV lamps and monochronometer for photochemistry, anoxic chamber, Geographic Information Systems (GIS) computational laboratory, electromagnetic and acoustic doppler velocity meters, laboratory and field hydrogeology equipment, campus drill rig, microstructures and fabrics analysis instruments, research microscopes with reflectance capabilities, rock preparation and mineral separation laboratories, computer network with direct access to supercomputer facilities, nitrogen Permeameter 400, helium Porosimeter 300, Solaris Impedance Meters.

Further information is found at the following URL https://www.geol.umd.edu/graduate/index.php

Geospatial Information Science, Master of Professional Studies (M.P.S.)

Non-thesis only (project required): 31 credits total

Students choosing the Master of Professional Studies degree track need to complete 31 credit hours of approved coursework with an average grade of B.

Course	Title	Credits
Required courses:		
GEOG651		3
GEOG652	Digital Image Processing and Analysis	3
GEOG653	Spatial Analysis	3
GEOG656	Programming and Scripting in GIS	3
GEOG677	Internet GIS	3
GEOG657	Web Programming	3
GEOG795	Professional Practices Seminar	1
GEOG797	Professional Project	3
Select three of the following:		9
GEOG654	GIS and Spatial Modeling	
GEOG655	Spatial Database	
GEOG650		
GEOG796	GIS Project Management	
GEOG660	Advanced Remote Sensing Using Lidar	
GEOG670	Open Source GIS	
Total Credits		31

Geospatial Information Science (MPGC)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The **Master of Professional Studies in Geospatial Information Sciences Program** is dedicated to providing the most up-to-date education on geospatial technology, theory and applications. The courses cover spatial analysis, statistics, programming, databases, modeling, remote sensing, Internet GIS, Mobile GIS, and Open Source GIS. This program is administered with Nanjing Normal University.

Financial Assistance

There are no fellowships available in this program.

Contact

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Website: http://geog.umd.edu/gis

Courses: GEOG

Relationships: Geographical Sciences (GEOG) (p. 213) Geospatial Information Sciences (Z035) (p. 220)

Admissions

General Requirements

- Statement of Purpose[1]
- Transcript(s)[1]
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements)): TOEFL/IELTS/PTE or successful in person exam/video.

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmpgsmpgcz035_0.pdf)
- Official Copy of diploma/certificate of graduation: Transcripts, diplomas and certificates of graduation must be In the original language with literal English translation.

The Graduate School requires all admitted graduate students to have a baccalaureate degree from a regionally accredited college or university in the United States, or the equivalent of a baccalaureate degree in another country. A GPA of 3.0 is normally required for admission into this program. Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	N/A
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	21 May

Other Deadlines: Please visit the program website at http://geog.umd.edu/gis

Requirements

- Geospatial Information Science, Master of Professional Studies (M.P.S.) (p. 218)

Facilities and Special Resources

All registered students have full access to the facilities and resources (e.g. libraries, gym, computer labs) on campus just like any other traditional student. Students also have full access to the resources (e.g. computer labs, software applications, seminars, etc) in the Geographical Sciences Department as regular graduate students. The program has a dedicated lab for its students as well where they can study.

Geospatial Information Sciences, Master of Professional Studies (M.P.S.)

Non-thesis only (project required): 31 credits total

Students choosing the Master of Professional Studies degree track need to complete 31 credit hours of approved coursework with an average grade of B.

Course	Title	Credits
Required courses:		
GEOG651		3
GEOG652	Digital Image Processing and Analysis	3
GEOG653	Spatial Analysis	3
GEOG656	Programming and Scripting in GIS	3
GEOG677	Internet GIS	3
GEOG657	Web Programming	3
GEOG795	Professional Practices Seminar	1
GEOG797	Professional Project	3
Select three of the following:		9
GEOG661	Fundamentals of Geospatial Intelligence	
GEOG663	Big Data Analytics	
GEOG654	GIS and Spatial Modeling	
GEOG650		
GEOG660	Advanced Remote Sensing Using Lidar	
GEOG655	Spatial Database	
GEOG670	Open Source GIS	
or GEOG788	(GEOG778A)	
GEOG796	GIS Project Management	
Total Credits		31

Geospatial Information Sciences (MPGS)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The **Master of Professional Studies in Geospatial Information Sciences Program** is dedicated to providing the most up-to-date education on geospatial technology, theory and applications. The courses cover spatial analysis, statistics, programming, databases, modeling, remote sensing, Internet GIS, Mobile GIS, and Open Source GIS. Both **MPS degree (31 Credits)** and **Graduate Certificate (12 Credits)** in GIS are offered.

Financial Assistance

There are no fellowships available in this program. However, there are potential Teaching Assistantships available depending on the student's qualification.

Contact

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Fax: 301.314.1883
Email: kbergery@umd.edu

Website: http://www.geog.umd.edu/gis

Courses: GEOG

Relationships: Geographical Sciences (GEOG) (p. 213) Geospatial Information Sciences (Z035) (p. 220)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmpgsmpgcz035.pdf)

The Graduate School requires all admitted graduate students to have a baccalaureate degree from a regionally accredited college or university in the United States, or the equivalent of a baccalaureate degree in another country. A GPA of 3.0 is normally required for admission into this

program. Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis.

Applicants with foreign credentials must submit academic records in the original language with literal English translations.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	15 Feb
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	N/A

Other Deadlines: Please visit the program website at http://www.geog.umd.edu/gis

Requirements

- Geospatial Information Sciences, Master of Professional Studies (M.P.S.) (p. 219)

Facilities and Special Resources

All registered students have full access to the facilities and resources (e.g. libraries, gym, computer labs) on campus just like any other traditional student. Students also have full access to the resources (e.g. computer labs, software applications, seminars, etc) in the Geographical Sciences Department as regular graduate students. The program has a dedicated lab for its students as well where they can study or take lectures in a real environment if they want to.

Geospatial Information Sciences, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Students choosing the Graduate Certificate track need to complete 12 credit hours of approved coursework with an average grade of B.

Course	Title	Credits
Required courses:		
GEOG651		3
GEOG653	Spatial Analysis	3
GEOG656	Programming and Scripting in GIS	3
Select one of the following:		3
GEOG655	Spatial Database	
GEOG657	Web Programming	
GEOG654	GIS and Spatial Modeling	
GEOG650		
GEOG661	Fundamentals of Geospatial Intelligence	
GEOG663	Big Data Analytics	
Total Credits		12

Geospatial Information Sciences (Z035)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The **Master of Professional Studies in Geospatial Information Sciences Program** is dedicated to providing the most up-to-date education on geospatial technology, theory and applications. The courses cover spatial analysis, statistics, programming, databases, modeling, remote sensing, Internet GIS, Mobile GIS, and Open Source GIS. Both **MPS degree (31 Credits)** and **Graduate Certificate (12 Credits)** in GIS are offered.

Financial Assistance

There are no fellowships available in this program. However, there are potential Teaching Assistantships available depending on the student's qualification.

Contacts

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Email: kbergery@umd.edu

Website: http://www.geog.umd.edu/gis

Courses: GEOG

Relationships: Geographical Sciences (GEOG) (p. 213) Geospatial Information Sciences (MPGS) (p. 219)

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmpgsmpgcz035.pdf)

The Graduate School requires all admitted graduate students to have a baccalaureate degree from a regionally accredited college or university in the United States, or the equivalent of a baccalaureate degree in another country. A GPA of 3.0 is normally required for admission into this program. Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis.

Applicants with foreign credentials must submit academic records in the original language with literal English translations.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	15 Feb
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.geog.umd.edu/gis

Requirements

- Geospatial Information Sciences, Post-Baccalaureate Certificate (P.B.C.) (p. 220)

Facilities and Special Resources

All registered students have full access to the facilities and resources (e.g. libraries, gym, computer labs) on campus just like any other traditional student. Students also have full access to the resources (e.g. computer labs, software applications, seminars, etc) in the Geographical Sciences Department as regular graduate students. The program has a dedicated lab for its students as well where they can study or take lectures in a real environment if they want to.

Geospatial Intelligence, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

Please contact the department for specific course information

The MPS GEOINT program encompasses a 30-credit (10 units of 3-credit courses) course structure comprising five core courses and a selection of five courses among electives. Students are required to accomplish an averge grade of B to receive a degree.

Course	Title	Credits
Select five of the following core courses:		15
GEOG664	GEOINT Systems and Platforms	
GEOG656	Programming and Scripting in GIS	
GEOG661	Fundamentals of Geospatial Intelligence	
GEOG662	Advances in GIS and Remote Sensing	
GEOG695		
GEOG665	Algorithms for Geospatial Intelligence Analysis	
GEOG697		
Select five of the following electives:		15
GEOG680		
GEOG682		
GEOG683		
GEOG663	Big Data Analytics	
GEOG651		
GEOG660	Advanced Remote Sensing Using Lidar	
GEOG657	Web Programming	
GEOG684		
GEOG685		
GEOG687		
GEOG694	Computerized Map Projections and Transformations	
GEOG690		
GEOG686	Mobile GIS and Geocomputing	
GEOG691		
GEOG692		
GEOG693		
Total Credits		30

Geospatial Intelligence (MPGI)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The **Master of Professional Studies in Geospatial Intelligence (MPS GEOINT)** is dedicated to providing workforce-focused training at graduate level in ways that can nimbly respond to developments in what is often a rapidly shifting landscape of applied problem-sets, analysis schemes, big and growing data-sets, and software platforms that characterize today's geospatial intelligence.

The MPS GEOINT program encompasses a 30-credit (10 units of 3-credit courses) course structure comprising five core courses and a selection of five courses among electives. The courses cover spatial analysis, remote sensing, big data analytics, geovisualization, programming in web and mobile GIS, geospatial intelligence in various fields, etc.

The **Graduate Certificate in Professional Studies in Geospatial Intelligence (GCPS GEOINT)** program is also offered, which entails 12 credits from four courses (two core and two elective courses). The credits earned from a GCPS GEOINT can be transferred towards the MPS GEOINT.

Financial Assistance

Teaching Assistantships are offered depending on availability and students' qualifications.

Contact

Ruibo Han
Director of Programs
1111B LeFrak Hall
7251 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.314.1343
Email: ruibo@umd.edu

Website: http://geospatial.umd.edu/landing/Education

Courses: GEOG

Relationships: Geographical Sciences (GEOG) (p. 213) Geospatial Information Sciences (Z035) (p. 220) Geospatial Information Sciences (MPGS) (p. 219) Geospatial Intelligence (Z109) (p. 223)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Prerequisites: Introductory Courses in GIS, Remote Sensing, and Statistics or permission of program administrator.

The Graduate School requires all admitted graduate students to have a baccalaureate degree from a regionally accredited college or university in the United States, or the equivalent of a baccalaureate degree in another country. A GPA of 3.0 is normally required for admission into this program. Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis.

Applicants with foreign credentials must submit academic records in the original language with literal English translations.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	Priority: 14 Dec / Final: 15 Feb
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	N/A

Other Deadlines: Please visit the program website at http://geospatial.umd.edu/landing/Education

Requirements

- Geospatial Intelligence, Master of Professional Studies (M.P.S.) (p. 221)

Facilities and Special Resources

New classroom facilities are provided for GEOINT programs as part of the development of the Center for Geospatial Information Science. A dedicated set of server and high-performance computing clusters are also provided from CGIS for teaching GEOINT courses. Students also have full access to the resources (e.g. computer labs, software applications, seminars, etc) in the Geographical Sciences Department as regular graduate students. All registered students have full access to the facilities and resources (e.g. libraries, gym, computer labs) on campus.

Our local surroundings play host to the center of influence for the geospatial intelligence industry in the United States. The National Geospatial-Intelligence Agency employs 8,500 people at the third largest federal building in the D.C. region at nearby Springfield, VA. The NASA Goddard Space Flight Center in nearby Greenbelt, and the United State Geological Survey in nearby Reston, VA serve as the nexus for the nation's earth science geospatial intelligence. The U.S. Census Bureau in nearby Suitland, MD is tasked with a decennial nationwide data collection exercise that mobilizes a huge workforce to perform geospatial intelligence gathering year-round.

Geospatial Intelligence, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Select two of the following core courses:		6
GEOG664	GEOINT Systems and Platforms	
GEOG656	Programming and Scripting in GIS	
GEOG661	Fundamentals of Geospatial Intelligence	
GEOG662	Advances in GIS and Remote Sensing	
GEOG695		
GEOG665	Algorithms for Geospatial Intelligence Analysis	
GEOG697		
Select two of the following electives:		6
GEOG680		
GEOG682		
GEOG683		
GEOG663	Big Data Analytics	
GEOG651		
GEOG660	Advanced Remote Sensing Using Lidar	
GEOG657	Web Programming	
GEOG684		
GEOG685		

GEOG687	
GEOG694	Computerized Map Projections and Transformations
GEOG690	
GEOG686	Mobile GIS and Geocomputing
GEOG691	
GEOG692	
GEOG693	
Total Credits	12

Geospatial Intelligence (Z109)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The **Graduate Certificate in Professional Studies in Geospatial Intelligence (GCPS GEOINT)** is dedicated to providing workforce-focused training at graduate level in ways that can nimbly respond to developments in what is often a rapidly shifting landscape of applied problem-sets, analysis schemes, big and growing data-sets, and software platforms that characterize today's geospatial intelligence.

The MPS GEOINT program encompasses a 12-credit (4 units of 3-credit courses) course structure comprising two core courses and a selection of two courses among electives. The courses cover spatial analysis, remote sensing, big data analytics, geovisualization, programming in web and mobile GIS, geospatial intelligence in various fields, etc.

The **Master of Professional Studies in Geospatial Intelligence (MPS GEOINT)** is also offered, which entails 30 credits from 10 courses (five core and five elective courses). The credits earned from a GCPS GEOINT can be transferred towards the MPS GEOINT.

Financial Assistance

Teaching Assistantships are offered depending on availability and students' qualifications.

Contact

Ruibo Han
Director of Programs
1111b LeFrak Hall
7251 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.314.1343
Email: ruibo@umd.edu

Website: http://geospatial.umd.edu/landing/Education

Courses: GEOG

Relationships: Geographical Sciences (GEOG) (p. 213) Geospatial Information Sciences (MPGS) (p. 219) Geospatial Information Sciences (Z035) (p. 220) Geospatial Intelligence (MPGI) (p. 221)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Prerequisites: Introductory Courses in GIS, Remote Sensing, and Statistics or permission of program administrator.

The Graduate School requires all admitted graduate students to have a baccalaureate degree from a regionally accredited college or university in the United States, or the equivalent of a baccalaureate degree in another country.

Applicants with foreign credentials must submit academic records in the original language with literal English translations.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	Preferred: 14 Dec / Final: 15 Feb
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	N/A	N/A

Other Deadlines: Please visit the program website at http://geospatial.umd.edu/landing/Education

Requirements

- Geospatial Intelligence, Post-Baccalaureate Certificate (P.B.C.) (p. 222)

Facilities and Special Resources

New classroom facilities are provided for GEOINT programs as part of the development of the Center for Geospatial Information Science. A dedicated set of server and high-performance computing clusters are also provided from CGIS for teaching GEOINT courses. Students also have full access to the resources (e.g. computer labs, software applications, seminars, etc) in the Geographical Sciences Department as regular graduate students. All registered students have full access to the facilities and resources (e.g. libraries, gym, computer labs) on campus.

Our local surroundings play host to the center of influence for the geospatial intelligence industry in the United States. The National Geospatial-Intelligence Agency employs 8,500 people at the third largest federal building in the D.C. region at nearby Springfield, VA. The NASA Goddard Space Flight Center in nearby Greenbelt, and the United State

Geological Survey in nearby Reston, VA serve as the nexus for the nation's earth science geospatial intelligence. The U.S. Census Bureau in nearby Suitland, MD is tasked with a decennial nationwide data collection exercise that mobilizes a huge workforce to perform geospatial intelligence gathering year-round.

German Literature and Language, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

The M.A. degree program offers both a thesis and non-thesis option. For the thesis option, the student must complete 24 hours of coursework, the thesis with oral defense and a written comprehensive examination. The non-thesis option requires 30 hours of coursework, a mini-thesis with oral defense and a written comprehensive examination. For both options the comprehensives consist of two three-hour examinations based on the coursework and the M.A. reading list.

Course	Title	Credits
GERM620	Methods of German Literary Studies I: Theory	3
German courses at the 600-800 level		15
Thesis or Non-Thesis Requirements		12
Thesis:		
Electives		
GERM799	Master's Thesis Research	
Pass an oral defense and a written Master's comprehensive exam		
Non-Thesis:		
Electives		
Written Master's comprehensive exam		
Total Credits		30

[1] All Teaching Assistants are required to take SLLC601 for one credit. This course counts towards the total credits required.

German Literature and Language, Doctor of Philosophy (Ph.D.)

Doctoral students must complete 24 credits of coursework beyond the master's degree over a period of at least one year at the University of Maryland in addition to 12 credits of doctoral dissertation research. Other doctoral requirements include:

1. a reading skill examination in a language other than English or German, which may be another Germanic language or a language related to the candidate's research;
2. comprehensive written examinations;
3. presentation of the dissertation, an original study in the field of specialization on a topic approved by the adviser and the examining committee; and
4. the oral defense of the dissertation (one to two hours)

Course	Title	Credits
Coursework beyond the master's degree		24
Dissertation Research Requirements		
GERM899	Doctoral Dissertation Research	12
Total Credits		36

German Literature and Language (GERS)

Graduate Degree Program
College: Arts and Humanities

Abstract

The German Program of the Department of Germanic Studies offers graduate study leading to the M.A. and Ph.D. degrees. The main focus is on Modern German Studies combining both discipline-based and interdisciplinary courses. The intellectual focus of the degrees is German-speaking Europe from the Enlightenment to the present, as represented in literary and non-literary texts, and other cultural productivity.

The degrees reflect the paradigm shift within the field of German language and literature expanding the focus of Germanistik to a broader concentration on cultural studies which include gender studies, film studies, and postcolonial theory.

A concentration in Medieval Studies is also offered on an interdepartmental basis.

Financial Assistance

The German Program offers graduate fellowships and teaching assistantships, and the Graduate School offers, **on a competitive basis, fellowships, and grants.**

Contact

Hester Baer
Associate Professor & Graduate Director
Department of Germanic Studies
School of Languages, Literatures, and Cultures
University of Maryland
3225 Jimenez Hall
4125 North Library Lane
College Park, MD 20742
Telephone: 301.405.4101

Website: http://www.sllc.umd.edu

Courses: GERM

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume

- Writing Sample
- Publications/Presentations

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	16 Jan	25 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	1 Feb	25 Sep

Other Deadlines: Please visit the program website at http://www.sllc.umd.edu

Requirements

- German Literature and Language, Doctor of Philosophy (Ph.D.) (p. 224)
- German Literature and Language, Master of Arts (M.A.) (p. 224)

Facilities and Special Resources

In addition to its course offerings listed below, the German Program of the Department of Germanic Studies sponsors the German Club, the University of Maryland Chapter of Delta Phi Alpha (the national German language honors society). The department participates in the University Honors Programs and has a departmental honors program. Distinguished scholars and lecturers as well as visiting professors visit the metropolitan area and campus regularly. College Park's proximity to Washington, D.C., facilitates participation in the many cultural functions of the capital with its wealth of German and Scandinavian social groups and national societies: the Embassies of Austria, Denmark, Germany, Norway, Sweden, Switzerland; the German Historical Institute, and the Goethe Institute.

Gerontology, Post-Baccalaureate Certificate (P.B.C.)

21 credits required

At least 12 credits should be designated at the 500 level or higher. At least 3 credits should be completed on the College Park campus.

Required courses with aging related content:

Course	Title	Credits
Course that includes physical bases of aging		3
Course that includes psychological bases of aging		3
Course that includes social bases of aging		3
Internship		6
Elective courses with aging related content		6
Total Credits		21

Gerontology (doctoral level) (Z101)

Graduate Certificate Program
College: Public Health

abstract

Students gain the knowledge and skills needed to effectively promote the health and well being of the growing population of baby boomers and older persons. Designed for students pursuing a doctoral program in the University System of Maryland or those who have previously earned a graduate degree from an accredited institution, the Graduate Certificate in Gerontology can be valuable complement to many degree programs. The GGCP offers students an individually tailored curriculum of course work, supervised internships and research.

contact

Lori Simon-Rusinowitz, Ph.D.
Director of Graduate Studies
Department of Health Service Administration
3310 SPH Building
University of Maryland
College Park, MD 20742
Telephone: 301.405.2548
Email: lasr@umd.edu

Website: http://www.sph.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (none)
- CV/Resume
- Previously earned doctoral degree

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	1 Jun	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Gerontology, Post-Baccalaureate Certificate (P.B.C.) (p. 225)

Gerontology, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

At least 12 credits should be designated at the 500 level or higher. At least 3 credits should be completed on the College Park campus.

Required courses with aging related content:

Course	Title	Credits
Course that includes physical bases of aging		3
Course that includes psychological bases of aging		3
Course that includes social bases of aging		3
Internship		3
Elective courses with aging related content		6
Total Credits		18

Gerontology (master's level) (Z100)

Graduate Certificate Program
College: Public Health

abstract

Students gain the knowledge and skills needed to effectively promote the health and well being of the growing population of baby boomers and older persons. Designed for students pursuing a master's program in the University System of Maryland or those who have previously earned a graduate degree from an accredited institution, the Graduate Certificate in Gerontology can be valuable complement to many degree programs. The GGCP offers students an individually tailored curriculum of course work, supervised internships and research.

CONTACT

Lori Simon-Rusinowitz, Ph.D.
Director of Graduate Studies
Department of Health Service Administration
3310 SPH Building
University of Maryland
College Park, MD 20742
Telephone: 301.405.2548
Email: lasr@umd.edu

Website: http://www.sph.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (none)
- CV/Resume
- Previously earned Master's degree

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	1 June	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Gerontology, Post-Baccalaureate Certificate (P.B.C.) (p. 226)

Global Health, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
MIEH605	Fundamentals of Global Health	3
MIEH620	Global Health Communication and Promotion	3
MIEH610	Global Health Program Planning and Evaluation	3
One additional approved course		3
Total Credits		12

Global Health (Z070)

Graduate Certificate Program
College: Public Health

Abstract

The Graduate Certificate in Global Health is designed to provide basic knowledge in global health delivery to those employed or seeking employment in positions requiring this knowledge or to individuals who desire this added credential. The Global Health Certificate provides knowledge of issues, policies, and practices in global health that enables individuals (many of whom do not have public health backgrounds) to work effectively in agencies and programs providing global health

services. As an area for study, research, and practice, global health emphasizes translational health issues, synthesizing population-based prevention with evidenced-based, community-supported initiatives.

The Global Health Certificate requires completion of four courses (12 credits), three of which are required and a fourth of which is an elective. The core curriculum includes foundational aspects of global health, communication and promotion, and program planning and evaluation. The elective topics include history, diplomacy and/or social marketing in Public Health. A blended learning format featuring seminar-style, face-to-face instruction and online learning is offered at the College Park campus. Course descriptions can be found here: http://sph.umd.edu/department/miaeh/certificate-global-health

The Global Health Certificate is offered through the University of Maryland's School of Public Health, a leader in the discovery, application, and dissemination of public and global health knowledge in the state of Maryland, the nation, and the world. The School of Public Health has specifically targeted programs, curricula, service and research dedicated to the understanding and improvement of global health.

Contact

Maurice Rocque
Maryland Institute for Applied Environmental Health
2234T School of Public Health Building
4200 Valley Drive
College Park, MD 20742
Telephone: 301.405.5509
Email: mrocque@umd.edu

Website: http://sph.umd.edu/degrees/certificate-global-health

Admissions
General Requirements

- Statement of Purpose: For Statement of Purpose explain why you are pursuing this certificate and what you hope to do with the completion of this certificate.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (1): The letter of recommendation needs to be an academic reference.
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Non-UMD students who would like to pursue the Certificate in Global Health should visit the UMD Graduate School Admissions (https://gradschool.umd.edu/admissions) page for detailed application steps. http://gradschool.umd.edu/admissions

UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). For additional requirements, please see: http://oes.umd.edu/professional-programs/global-health/gh-admission-information#international

Current graduate students within the School of Public Health may enroll in courses that fulfill the requirements of the Certificate in Global Health. Please contact your Graduate Director or the certificate program for more information.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	28 July	10 Jan
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://sph.umd.edu/degrees/certificate-global-health

Requirements

- Global Health, Post-Baccalaureate Certificate (P.B.C.) (p. 226)

Government and Politics, Master of Arts (M.A.)

30 credits required

Master of Arts (M.A.) The graduate program in the Department of Government and Politics is designed for doctoral students. Except for students participating in our dual-degree program with the United States Naval Academy, we do not accept students for the sole purpose of acquiring a Master's degree. Doctoral students may obtain a Master of Arts Degree during their course of doctoral study once they have satisfied the requirements associated with the Master's degree.

Course	Title	Credits
Core Requirements		
Complete 10 courses		30
Pass a comprehensive exam		
Complete two seminar papers		
Total Credits		30

Government and Politics, Doctor of Philosophy (Ph.D.)

Students are required to complete 42 credits of coursework, in addition to 12 credits of GVPT899. Students are also required to complete two comprehensive exams, a third year paper, and pass the Prospectus Defense.

The doctoral program is intended to provide students with the knowledge, methodological skills and research experience appropriate for persons who intend to enter the discipline of political science. Students must

complete 42 hours of graduate work including courses in political theory and research methods and pass written comprehensive examinations in two fields. Although formal coursework and field examinations are important components of the doctoral program, the research component, especially in the form of the dissertation is paramount. Consequently students who are able to demonstrate an interest in quality research activities and desire to become creators as well as consumers of knowledge are appropriate for the doctoral program.

Course	Title	Credits
Required courses:		
GVPT622	Quantitative Methods For Political Science	3
GVPT700	Scope and Method of Political Science	3
Select one of the following courses:		3
GVPT741	Ancient and Medieval Political Philosophy	
GVPT742	Modern Political Theory	
GVPT743	Contemporary Political Theory	
Complete courses in one of the following fields:		33
American Politics		
International Relations		
Comparative Politics		
Political Philosophy/Normative Political Theory		
Dissertation Research Requirements		
GVPT899	Doctoral Dissertation Research	12
Total Credits		54

Field Options

American Politics

Course	Title	Credits
GVPT770	Seminar in American Political Institutions	3
GVPT771	Seminar in American Political Behavior	3
Select 27 additional credits of GVPT courses at the 600 level or above		27
Total Credits		33

International Relations

Course	Title	Credits
GVPT708	Seminar in International Relations Theory (GVPT708A - Seminar in International Relations Theory)	3
Select 30 additional credits of GVPT courses at the 600 level or above		30
Total Credits		33

Comparative Politics

Course	Title	Credits
GVPT780	Seminar in the Comparative Study of Politics	3
Select 30 additional credits of GVPT courses at the 600 level or above		30
Total Credits		33

Political Philosophy/Normative Political Theory

Course	Title	Credits
Select 33 credits of GVPT courses at the 600 level or above		33
Total Credits		33

Government and Politics (GVPT)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Department of Government and Politics offers a Ph.D. degree in political science, intended primarily for those planning academic careers. Students can specialize in American politics, comparative politics, international relations, and political theory. In addition, students can study in depth more specialized fields such as public law, national security, public policy, political psychology, international and inter-ethnic conflict, international political economy, urban politics, post-Soviet and post-communist studies, East-Asian studies, environmental politics, and the politics of advanced industrial societies.

Financial Assistance

In addition to fellowships and teaching assistantships, the Department also has a public service intern program for students interested in State government. There are also a limited and variable number of research positions available.

Fellowships in Support of Diversity and Inclusion (https://gvpt.umd.edu/graduate/fellowships-support-diversity-and-inclusion-behavioral-and-social-sciences) (optional): *If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences (2017-18), please be sure to upload your materials under "4. Supplementary Application Two" when submitting your online admissions application.*

Contact

Director of Graduate Studies
Department of Government and Politics
3140 Tydings Hall
7343 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4161
Email: gvptgrad@deans.umd.edu

Website: http://www.gvpt.umd.edu

Courses: GVPT

Keywords: American Politics; Comparative Politics; International Politics; Political Economy; Political Theory; Public Law; National Security Policy; East European and Post-Communist Studies; Environmental Politics; Formal Theory; International Political Economy. (See Public Policy and Public Management for additional options.)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample

The Department recruits highly qualified students, and admits only a limited number of the strongest applicants. The Admissions Committee rarely grants provisional or conditional admission to the graduate program. The Department does not usually admit M.A. applicants. Only students whose ultimate objective is the Ph.D. should apply for direct admission to that program. Admission is granted only for the Fall Semester.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	17 Jan

Other Deadlines: Please visit the program website at http://www.gvpt.umd.edu

Requirements

- Government and Politics, Doctor of Philosophy (Ph.D.) (p. 227)
- Government and Politics, Master of Arts (M.A.) (p. 227)

Facilities and Special Resources

Graduate students in the department participate in the activities of the Public Service Intern Program, Project ICONS, the Center for International Development and Conflict Management, the Center for the Study of American Politics and Citizenship, the Center for the Study of Post-Communist Societies, The Committee on the Political Economy of the Good Society, and the Harrison Program on the Future Global Agenda.

Government and the Private Economy, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Government & The Private Economy (Z002)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Government and the Private Economy, Post-Baccalaureate Certificate (P.B.C.) (p. 229)

Health Administration, Master of Health Administration (M.H.A.)

Non-thesis option: 45 credits
Thesis option: 45 credits

Students completing the thesis option will replace their 3-credit capstone (HLSA786) with a 6-credit thesis experience (HLSA799). Three credits of the HLSA799 will then replace one course in the management module, so that only 6 courses in the management module are required for graduation.

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
HLSA601	Introduction to Health Systems	3
HLSA710	Healthcare Mangement: Foundations and Principles	3

HLSA740	Healthcare Strategic Planning and Marketing	3
HLSA770	Continuous Quality Improvement in Healthcare	3
HLSA720	Health Law and Ethics	3
HLSA778	Internship in Public Health	4
HLSA711	Health Economics and Analysis	3
HLSA740	Healthcare Strategic Planning and Marketing	3
HLSA786	Capstone Project in Public Health	3
HLSA721	Using Demographic Data for Health Policy Analysis	3
Total Credits		45

Health Administration (HLSA)

Graduate Degree Program
College: Public Health

Abstract

The Master of Health Administration (MHA) program at the University of Maryland, College Park offers students a rigorous, multi-disciplinary program with courses in public health services administration, epidemiology, environmental health, biostatistics, health behaviors and determinants, health policy, health law and ethics, health economics and analysis, strategic management of human resources, health service information systems, financial management of health organizations, marketing for competitive health service, quality assessment and evaluation, and health care leadership and communications. The 45-credit professional degree will prepare graduates to manage the many complex health-related organizations including hospitals, long term care facilities, managed care organizations, rehabilitation agencies, public health clinics, state agencies, among others. With the impending retirement of the first wave of baby boomers, public health and health care organizations face large scale losses of middle and executive level administrators.

Public health and health services now comprise the largest industry in the United States, producing nearly one seventh of the United States' gross national product. According to the World Health Report 2000, the health care system should be conceptualized as including not only health services, but also public health and social welfare activities. The Department of Health Services Administration adopts this integrated approach to address current health needs, provide leadership in a rapidly evolving health care industry, and anticipate future health challenges in an expanding global economy. The MHA program is considered to be equivalent to the MPH and is accredited by the Council on Education for Public Health (CEPH).

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Website: http://sph.umd.edu/department/hlsa/master-health-administration-mha-program-2018

Relationships: **Health Equity (HLEQ)** (p. 231) **Health Policy Analysis and Evaluation (HPAE)** (p. 232) **Health Services (PHHS)** (p. 233) **Principles of Public Health (Z076)** (p. 332) **Public Health Practice and Policy (PHPP)** (p. 343)

Admissions

Applications to the MHA program in the University of Maryland School of Public Health are processed through the Schools of Public Health Application Service (SOPHAS).

Applications for the MHA program are reviewed with consideration to the following criteria:

1. Minimum 3.0 undergraduate GPA
2. Undergraduate and graduate transcripts (if applicable)
3. GRE scores taken within the past 5 years
4. 3 letters of recommendation that address the applicant's academic capabilities and probability of success in graduate school
5. Statement of professional goals and interests and their congruence with those of the program
6. Relevant academic and work experience

Applicants for the Master of Health Administration degree should be sure to the use the HLSA major code when selecting the program on the Graduate School application.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 14 Dec / Final: 12 Apr	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Priority: 14 Dec / Final: 15 Feb	N/A

Other Deadlines: Please visit the program website at http://sph.umd.edu/department/hlsa/master-health-administration-mha-program

Requirements

- Health Administration, Master of Health Administration (M.H.A.) (p. 229)

Health Equity, Master of Public Health (M.P.H.)

Non-thesis only: 45 credits

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1

SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
HLSA611	Introduction to Health Equity	3
HLSA787	Minority Health and Health Equity	3
HLSA721	Using Demographic Data for Health Policy Analysis	3
HLSA601	Introduction to Health Systems	3
MIEH600	Foundations of Environmental Health	3
HLSA778	Internship in Public Health	4
MIEH730	Environmental Justice, Built Environment, and Health Disparities	3
HLSA777	Program Evaluation Field Experience	3
HLSA786	Capstone Project in Public Health	3
HLSA790	Advanced Methods in Health Services Research	3
Total Credits		45

Health Equity (HLEQ)

Graduate Degree Program
College: Public Health

Abstract

The Master of Public Health (MPH) degree with a concentration in Health Equity is a 45-credit interdisciplinary professional degree. It is a school wide program, currently administered by the Department of Health Services Administration.

The MPH program in Health Equity is designed to train students as public health scientists and practitioners that focus practice and/or research activities on the recognition, description and elimination of health disparities. Health disparities exist across several groups such as race/ethnic groups, geographic residence, gender, sexual orientation, age, and disability status. Public health and health care practitioners and researchers play a critical role in the identification and amelioration of health disparities and in working towards achieving health equity.

The MPH program in Health Equity is a unique and interdisciplinary program with students taking courses across all departments at UMD-SPH and across the UMD campus. The expertise gained through the MPH in Health Equity prepares students for careers that involve integrating health equity into public health practice at various levels. Various agencies in the state (e.g., county and state health departments) and across the nation (e.g., NIH and CDC), including colleges/universities, health-related agencies, community groups, and even large corporations (hospitals and insurance plans), employ public health professionals with a deep understanding of health disparities in order to design, implement, evaluate, and monitor interventions and policies to improve the health of their constituents by working towards health equity.

To accommodate a variety of career pursuits, students have flexibility in designing their course structure. Once a foundational knowledge is acquired through the MPH program's core requirements, students are encouraged to take electives across a range of disciplines. A large number of elective courses are available within the existing graduate curriculum across all departments in the School of Public Health as well as across other UMD colleges and DC area institutions. Students will be advised to work with SPH faculty for recommendations about how certain elective courses will best support particular career aspirations.

The curriculum is adaptable to both a full and part-time student status.

Please see our website for updated information on the program sph.umd.edu/department/hlsa/master-public-health-mph-program-health-equity

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Relationships: Health Administration (HLSA) (p. 230) Health Policy Analysis and Evaluation (HPAE) (p. 232) Health Services (PHHS) (p. 233) Principles of Public Health (Z076) (p. 332) Public Health Practice and Policy (PHPP) (p. 343)

Admissions

Applications to the MPH program in the University of Maryland School of Public Health are processed through the Schools of Public Health Application Service (SOPHAS).

Applications for the MPH program are reviewed with consideration to the following criteria:

1. Minimum 3.0 undergraduate GPA
2. Undergraduate and graduate transcripts (if applicable)
3. GRE scores taken within the past 5 years
4. 3 letters of recommendation that address the applicant's academic capabilities and probability of success in graduate school
5. Statement of professional goals and interests and their congruence with those of the program
6. Relevant academic and work experience

Applicants for the MPH in Health Equity degree should be sure to the use the HLEQ major code when selecting the program on the Graduate School application.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 14 Dec / Final: 12 Apr	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Priority: 14 Dec / Final: 15 Feb	N/A

Other Deadlines: Please visit the program website at http://sph.umd.edu/department/hlsa/master-public-health-mph-program-health-equity

Requirements

- Health Equity, Master of Public Health (M.P.H.) (p. 230)

Health Policy Analysis and Evaluation, Master of Public Health (M.P.H.)

Non-thesis only: 45 credits

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
HLSA601	Introduction to Health Systems	3
HLSA702	Policy and Politics of Health	3
HLSA723	Health Policy Analysis and Advocacy	3
HLSA621		3
HLSA711	Health Economics and Analysis	3
HLSA775	Public Health Research	3
HLSA778	Internship in Public Health	4
HLSA777	Program Evaluation Field Experience	3
HLSA786	Capstone Project in Public Health	3
HLSA714	Economic Evaluation of Medical Care	3
Total Credits		45

Health Policy Analysis and Evaluation (HPAE)

Graduate Degree Program
College: Public Health

Abstract

The Master of Public Health (MPH) degree with a concentration in Health Policy Analysis and Evaluation is a 45-credit professional degree offered by the Department of Health Services Administration.

The MPH program in Health Policy Analysis and Evaluation is designed to train students as public health scientists and practitioners that focus practice and/or research activities on the understanding, analysis, evaluation, and development of health policy. Various agencies in the state (e.g., county and state health departments) and across the nation (e.g., NIH and CDC), including colleges/universities, health-related agencies, community groups, and even large corporations (health care systems and insurance plans), employ public health professionals with a deep understanding of health policy in order to design, implement, analyze and evaluate policies to improve the health of their constituents. This program prepares graduates to take leadership positions in government agencies, consulting companies, health care organizations such as hospitals, community clinics, or health systems corporations, as well as health policy research organizations.

The MPH concentration in Health Policy Analysis and Evaluation at UMD-SPH is unique in that it focuses not only on health care policies but on the analysis and evaluation of all policies that affect the public's health such as policies related to public health organizations and other public policies in education, housing, nutrition, and environmental pollution, among others that have an impact on population health. Students in the program benefit from UMD-SPH location in the DC area, with its proximity to federal government and agencies tasked with developing and implementing health policies such as the Centers for Medicare & Medicaid Services, in particular the Center for Medicare & Medicaid Innovation, The Agency for Healthcare Policy and Research, the Environmental Protection Agency and Health Resources and Services Administration, as well as top private and non-profit research institutions such as RAND, Mathematica, The Urban Institute, and The Brookings Institution, which conduct high-quality, independent research and provide innovative, practical recommendations to health policy makers. Faculty in the HLSA department has active collaborations with several of these agencies and institutions and students in the department have access to internships, capstone projects and post-graduation positions at these organizations. In addition, students in the program benefit for the HLSA department's close links with the State of Maryland legislature and students have interned with General Assembly members; in those experiences, they have conducted research on legislative issues, co-authored legislation, assisted in preparation for hearings, and other policy related tasks.

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Relationships: Health Administration (HLSA) (p. 230) **Health Equity (HLEQ)** (p. 231) **Health Services (PHHS)** (p. 233) **Principles of Public Health (Z076)** (p. 332) **Public Health Practice and Policy (PHPP)** (p. 343)

Admissions

Applications to the MPH Health Policy Analysis and Evaluation program in the University of Maryland School of Public Health are processed through the Schools of Public Health Application Service (SOPHAS).

Applications for the MPH program are reviewed with consideration to the following criteria:

1. Minimum 3.0 undergraduate GPA
2. Undergraduate and graduate transcripts (if applicable)
3. GRE scores taken within the past 5 years
4. 3 letters of recommendation that address the applicant's academic capabilities and probability of success in graduate school

5. Statement of professional goals and interests and their congruence with those of the program
6. Relevant academic and work experience

Applicants for the MPH Health Policy Analysis and Evaluation degree should be sure to the use the HPAE major code when selecting the program on the Graduate School application.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 14 Dec / Final: 12 Apr	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Priority: 14 Dec / Final: 15 Feb	N/A

Other Deadlines: Please visit the program website at http://sph.umd.edu/department/hlsa/master-public-health-mph-program-health-policy-analysis-and-evaluation

Requirements

- Health Policy Analysis and Evaluation, Master of Public Health (M.P.H.) (p. 232)

Health Services, Doctor of Philosophy (Ph.D.)

59 credits required

Course	Title	Credits
Required courses:		
SPHL600	Foundations of Public Health	3
HLSA711	Health Economics and Analysis	3
HLSA725	Econometrics in Public Health	3
HLSA714	Economic Evaluation of Medical Care	3
HLSA787	Minority Health and Health Equity	3
HLSA790	Advanced Methods in Health Services Research	3
HLSA723	Health Policy Analysis and Advocacy	3
EPIB651	Applied Regression Analysis	3
HLSA770	Continuous Quality Improvement in Healthcare	3
HLSA799	Master's Thesis Research	6
HLSA721	Using Demographic Data for Health Policy Analysis	3
EPIB652	Categorical Data Analysis	3
HLSA766	Foundational Readings in Health Services Research	3
HLSA765	Dissertation Proposal Development Seminar	3
SPHL612	Research Ethics	1
HLSA709	Graduate Seminar	1
Dissertation Research Requirements		
Module 4: Dissertation credits:		
HLSA899	Doctoral Dissertation Research	12
Total Credits		59

Health Services (PHHS)

Graduate Degree Program
College: Public Health

Abstract

The goal of this program is to provide interdisciplinary training in research, practice, and policy analysis relevant to the planning, administration, management, and evaluation of health and public health programs. The degree program will prepare students to advance research, policy, and practice to order to improve access, cost, and quality of health services, with a particular emphasis on federal, state, and local health policy. The PhD in Health Services requires a minimum of 50 credits organized in four modules. After module 1 (required core health services research courses), students select a cognate area or track. Potential tracks are: health economics, health policy, health equity/sociology of health, and an interdisciplinary track (developed with advisor's approval). Together with their advisor, students select 5 elective courses in the track of which 2 must be methods courses relevant to the cognate area. After completing the track coursework, students must pass a qualifying exam. All students must take an ethics course, a proposal development course and must pass an oral proposal defense to be admitted to candidacy. After candidacy, students take a graduate seminar, and dissertation credits which culminate in a doctoral dissertation and an oral dissertation defense. For further information go to http://sph.umd.edu/department/hlsa/doctoral-program-health-services-phd

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Website: http://sph.umd.edu/department/hlsa/doctoral-program-health-services-phd

Relationships: Health Administration (HLSA) (p. 230) **Health Equity (HLEQ)** (p. 231) **Health Policy Analysis and Evaluation (HPAE)** (p. 232) **Principles of Public Health (Z076)** (p. 332) **Public Health Practice and Policy (PHPP)** (p. 343)

Admissions

Applications to the Health Services PhD program in the University of Maryland, School of Public Health are processed through the Schools of Public Health Application Services (SOPHAS).

Applications for the doctoral program in Health Services are reviewed with consideration to the following criteria:

1. Minimum 3.0 undergraduate GPA
2. Undergraduate and graduate transcripts
3. GRE scores taken within the past 5 years

4. 3 letters of recommendation that address the applicant's academic capabilities and probability of success in graduate school
5. Statement of professional goals and interests and their congruence with those of the program
6. Relevant academic and work experience

Applicants to the Ph.D. program in Health Services should be sure to use the PHHS major code when seleting the program on the Graduate School application.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 16 Nov / Final: 15 Feb	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Priority: 16 Nov / Final: 15 Feb	N/A

Other Deadlines: Please visit the program website at http://sph.umd.edu/department/hlsa/doctoral-program-health-services-phd

Requirements

- Health Services, Doctor of Philosophy (Ph.D.) (p. 233)

Hearing and Speech Sciences, Doctor of Audiology (Au.D.)

The Department of Hearing and Speech Sciences offers two doctoral degree options for individuals seeking a clinical doctorate in Audiology. See CAUD (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?CAUD) for more details. The Au.D. curriculum meets requirements specified in the Standards for the Certificate of Clinical Competence in Audiology (CCC-A) of the American-Speech-Language-Hearing Association. The CCC-A is the minimum qualification for practice in Audiology required by most states and jurisdictions. The Au.D. program for post-BA students requires 57 hours of graduate coursework, 4 credit hours for a capstone research project, 14 hours of clinical practicum registration and 18 credit hours of full-time clinical internship registration, for a total of 93 credit hours. Au.D. students must pass comprehensive examinations and complete a capstone research project. Full-time students are expected to complete the program in 4 years. The Au.D. 'fast-track' program for returning students who already hold an M.A. degree in Audiology and Clinical Certification requires 30 credit hours of graduate coursework and 6 credit hours for a doctoral research project. There is no minimum requirement of supervised clinical practicum experience, although clinical practicum will be available to students as needed. The dual degree Au.D./Ph.D. track in Audiology is designed for students wishing to be trained as scientist-practitioners. The dual degree program requires 60 credits of graduate coursework, 6 credit hours of pre-candidacy research, 12 credit hours of dissertation research, 12 credit hours of clinical practicum registration, and 18 credit hours of full-time clinical internship registration, for a total of 108 credit hours. The Au.D./Ph.D. curriculum is designed to meet requirements specified in the Standards for the Certificate of Clinical Competence in Audiology (CCC-A) of the American Speech-Language-Hearing Association, and by the Graduate School. Ph.D. students must develop an individual study plan with the approval of a faculty Program Planning Committee, pass comprehensive examinations, and complete a dissertation and oral defense. Full-time students are expected to complete the dual-degree program in approximately 6 years.

Hearing and Speech Sciences, Master of Arts (M.A.)

The Department of Hearing and Speech Sciences offers the Master of Arts degree with major emphasis in Speech-Language Pathology (p. 385) with either the thesis or the non-thesis option.The Master's degree is required by national credentialing standards for individuals intending to practice as speech pathologists in schools, hospitals, rehabilitation facilities, hearing and speech centers or in other clinical settings. Academic course work, which includes a minimum of 36 credits, is supplemented by additional credit registrations in supervised clinical practica in the University Speech and Hearing Clinic and in selected outside clinical facilities so that the graduate will meet the academic and practicum requirements for the Certificate of Clinical Competence (C.C.C.) issued by the American Speech-Language-Hearing Association, and be eligible for licensure in the State of Maryland and other jurisdictions. The Master's degree program is accredited by the Council on Academic Accreditation, the national accrediting agency which oversees graduate programs in Speech-Language Pathology and Audiology. A full description of the Master's degree program is available at our web site, listed below.

Hearing and Speech Sciences, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 32 credits of coursework, in addition to 18 credits of research requirements. Students are also required to participate in a Professional Development Seminar each year for five years, complete a teaching portfolio, and pass a comprehensive exam.

The Department also offers the Doctor of Philosophy degree with a major emphasis in speech, language or hearing. Students with a B.A. or M.A. are considered for admission to the doctoral program. Matriculated doctoral students will choose within their major a special interest area, which may focus on the normal aspects of their major or disorders related to the major. A student must also select a minor area of study either from within or outside departmental offerings. There are no foreign language requirements, but advanced courses in statistics and experimental research design are required for the degree. Course programs are planned by the student and a committee of at least four faculty members. All doctoral students are expected to participate in varied research activities within the Department for academic credit. Students must take written and oral comprehensive examinations for admission to candidacy after completing formal academic course work. Doctoral students must register for at least 12 semester hours of dissertation research credit before completing the degree. A full description of the Doctoral program, as well as listings of faculty research expertise, can be found at the Departmental web site, listed below.

Course	Title	Credits
Complete 32 credits of coursework		32
Dissertation Research Requirements		
HESP898	Pre-Candidacy Research	6

HESP899	Doctoral Dissertation Research	12
Total Credits		50

Hearing and Speech Sciences (HESP)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Department of Hearing and Speech Sciences provides the opportunity for advanced graduate study in the communication sciences and disorders. The department offers three degrees; this entry is for the Ph.D. program, with concentrations in Hearing, Speech or Language.

Students applying to the Ph.D. program can opt to receive an MA in Speech-Language Pathology en route to the final degree. Students interested in the clinical MA degree in Speech-Language Pathology (p. 385) should see SPLA and use this code when applying for admission to study; students interested in a clinical doctorate in Audiology should see CAUD and use this code when applying for admission to study). At the doctoral level, the Ph.D. is offered in Hearing and Speech Sciences, with concentrations in Hearing, Speech or Language.

Financial Assistance

A limited number of graduate assistantships and fellowships are available through the Department. Assistantships that carry teaching, research or clinical responsibilities are awarded on a competitive basis. The Department also recommends outstanding students for Graduate School Fellowships; many of these fellowships have early deadlines for recommendations, so students are encouraged to submit their applications to the department early to ensure full consideration for funding. Students may also seek assistantships elsewhere on campus (such as through the Dean's office or through other departments) or doctoral fellowships sponsored by Federal agencies (e.g., NIH or NSF) or private foundations (e.g., American Speech-Language-Hearing Foundation). Fellowships in Support of Diversity and Inclusion (optional): If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences, please be sure to upload your materials under "Supplementary Application" when submitting your online admissions application.

Fellowships in Support of Diversity and Inclusion (https://hesp.umd.edu/graduate/prospective-students-funding-your-graduate-education) (optional): If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences (2017-18), please be sure to upload your materials under "Supplementary Application" when submitting your online admissions application.

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Courses: HESP

Relationships: Clinical Audiology (CAUD) (p. 124) **Human Development (EDHD)** (p. 250) **Linguistics (LING)** (p. 279) **Neurosciences and Cognitive Science (NACS)** (p. 316) **Speech Language Pathology (SPLA)** (p. 385)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umdsupplementaryapplicationcaudsplahespcert.pdf)
- Writing Sample: Writing Sample should be recent, 5-10-page scholarly writing, such as a first-authored peer-reviewed publication or other scholarly assignment – uploaded to the Uploads Requirements section of the application.

Admission to the doctoral programs is on a very competitive basis. Our program is a mentoring-based program; we only accept doctoral students for whom there is an obvious mentor who is willing to work with that student. Students typically have high GPA and GRE scores, excellent letters of recommendation and statements of purpose, and a high-quality writing sample. Admission is currently confined to fall matriculation; early application is encouraged.

Admission to the Ph.D. degree program may be offered to applicants with either a Bachelor's or Master's degree. Clinical certification is not required for the degree, although a clinical graduate degree may be needed in addition to the Ph.D. degree for employment in some university settings. Students who wish to receive both degrees can apply to the Ph.D. program and receive a clinical MA while working towards the doctoral degree. Requirements for completion of a program of doctoral study are dependent on a student's prior background in the communication sciences and disorders.

Applicants interested in pursuing an integrated research-clinical doctorate in speech-language pathology (M.A./Ph.D.) should apply to the Ph.D. program and indicate their intention in the Statement of Purpose. Applicants interested in pursuing the dual-degree path in Audiology (Au.D.-Ph.D.) should apply to the Au.D and indicate their intention in the Statement of Purpose. Students may enter the Ph.D track towards the end of their 2nd year, pending decision of the departmental admissions committee.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.hesp.umd.edu

Requirements

- Hearing and Speech Sciences, Doctor of Audiology (Au.D.) (p. 234)
- Hearing and Speech Sciences, Doctor of Philosophy (Ph.D.) (p. 234)
- Hearing and Speech Sciences, Master of Arts (M.A.) (p. 234)

Facilities and Special Resources

The Department's facilities include

1. numerous modern research laboratories equipped to support research in the areas of: acoustic phonetics, psychoacoustics, infant and adult speech perception,neuropsychology, language and language development, voice, fluency and electrophysiology. There are multiple sound-attenuating chambers and one electrically-shielded chamber devoted to research with humans, which are all integrated with computers and peripheral equipment for acoustic signal development, signal analysis, presentation and on-line data collection;
2. the Hearing and Speech Clinic at UMCP. this clinic serves as the initial practicum site for all students pursuing clinical training. The Clinic includes multiple audiological test suites equipped for diagnostic testing, a complete hearing aid dispensary, a group rehabilitation room, and state-of-the-art equipment for behavioral and electrophysiological diagnostic testing, as well as hearing aid selection and fitting. Ten speech and language diagnostic and therapy rooms are integrated with observation areas; and
3. an on-site language pre-school (LEAP, the Language-Learning Early Advantage Program), also equipped for observation. Students pursuing clinical training in Audiology will also have access to the Audiology Service, Division of Audiology-Head and Neck Surgery, of the University of Maryland and University Hospital in Baltimore (UMB), for part-time clinical rotations or full-time clinical externships. This Service provides a full range of auditory and vestibular diagnostic and rehabilitative services in a large metropolitan hospital setting. Externally-funded research projects are an integral part of the activities at UMB. All of the clinical and research facilities are potentially available for the conduct of student-directed research projects, or for student participation in faculty-initiated research projects. Additional research and clinical facilities are available in the Washington and Baltimore metropolitan areas. The Library of Congress, the National Library of Medicine and the libraries of various medical schools in the Washington-Baltimore area supplement the University's extensive libraries at College Park.

The Department of Hearing and Speech Sciences participates in the Neuroscience and Cognitive Sciences graduate program (see NACS), the Comparative and Evolutionary Biology of Hearing Training Grant, and the Maryland Language Science Center, and has ties to the Center for Advanced Study of Language (CASL); these connections afford students the opportunity to work with faculty in other departments at the University of Maryland, College Park, or at UMB.

Higher Education, Master of Arts (M.A.)

Non-thesis only: 36 credits required

Course	Title	Credits
Required courses:		
EDHI650	Professional Seminar in Higher and Adult Education	3
EDHI652	Higher Education in American Society	3
EDHI666	The Academic Profession	3
EDHI754	Higher Education Finance	3
EDHI672	Modes of Inquiry in Education Research	3
EDHI489	Field Experiences in Education	3
EDHI679	Master's Seminar	3
EDHIxxx Electives		9
Qualitative Research course		3
Quantitative Research course		3
Total Credits		36

Higher Education, Doctor of Philosophy (Ph.D.)

Students are required to complete 90 credits beyond the Bachelor's degree, including 12 credits of EDHI899.

Ph.D. students in Higher Education are required to take a minimum of 90 credits beyond the bachelor's degree, some of which may be satisfied by prior study.

Course	Title	Credits
Required courses:		
EDCP870	Professional Issues Seminar	3
EDHI672	Modes of Inquiry in Education Research	3
EDHI895	Research Critique Seminar	3
Quantitative Research course		3
Qualitative Research course		3
Two additional Research courses		6
Cognate courses		24
Domain Knowledge courses		18
Disciplinary Perspectives		15
Dissertation Research Requirements		
EDHI899	Doctoral Dissertation Research	12
Total Credits		90

Higher Education (HIED)

Graduate Degree Program
College: Education

Abstract

Higher Education is an area of concentration within the Higher Education, Student Affairs, and International Education (HESI) program at the University of Maryland. As a nationally recognized graduate area of concentration, Higher Education at Maryland prepares students for leadership positions in higher education institutions and policy organizations, as well as engagement in scholarship. Alumni of the Higher Education concentration work as mid- and senior-level college administrators, higher education policy makers and analysts as well as university faculty.

It is important to note that while being a concentration in HESI, the Higher Education concentration is a distinct program with its own admission criteria and requirements. Students can take courses in the following areas: Policy and Finance; Diversity and Student Experiences; Leadership and Organization; and Academic Professions. In addition, in conjunction with their faculty advisor, students can design an area of specialization to meet their individual needs. Higher Education students can also take courses in areas such as business, public affairs, and the social sciences. Programs of study are individually designed by students in consultation with their faculty advisor. Department courses are usually offered in the afternoon and evening.

Doctoral students with an interest in student personnel services can take courses in the Student Affairs concentration. The two concentrations offer distinct degrees but cooperate closely on course offerings. Because the University of Maryland is located close to the nation's capital, masters and doctoral students also have access to many seminars and presentations by higher education leaders and public policy makers in the Washington DC area.

Additionally, the Higher Education concentration is in a unique position to also offer students opportunities that enable them to gain practical experience in the form of internships at federal government agencies, public policy think tanks, and higher education advocacy organizations throughout the Washington DC area. In the past, in addition to interning at offices on campus and the University System of Maryland, students have interned at the US Senate, National Center for Education Statistics, American Council on Education, and the Institute of Higher Education Policy.

Admitted students to the Higher Education concentration are invited to our Preview Program each spring in order to interview for assistantships across Academic Affairs, Student Affairs and other administrative offices. Nine-and twelve-month assistantships are available. Some doctoral applicants may be recommended for fellowships by our admissions committee.

Financial Assistance

The Department has a very limited number of merit-based fellowships and graduate assistantships available to students. Fellowships are awarded to doctoral students in March only for the following fall semester. Assistantships are also awarded in the spring for the following fall semester, but occasionally an assistantship may become available at another time of year. A large number of assistantships are also available throughout campus, and many students regularly find assistantships in other departments and offices on campus. Both fellowships and assistantships are awarded on a competitive basis. It is to the student's advantage to apply well before the published application deadlines and to submit a complete application package if they intend to be considered for a fellowship, assistantship, or other form of financial aid. It is a requirement that a student be admitted as a condition of eligibility. International students' applications are not considered complete and are not reviewed by the Department until they have received clearance from the Office of International Student and Scholar Services (ISSS), which can take additional time.

If you need information about ISSS clearance, visit the ISSS website at http://www.umd.edu/ies. For more information on financial assistance, see the department website: http://www.education.umd.edu/chse/admissions/finance.

Contact

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Department of Counseling, Higher Education, and Special Education
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7814 Regents Drive
University of Maryland
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Telephone: 301.405.2878
Fax: 301.405.9995
Email: donte@umd.edu

Carol Scott
Department of Counseling, Higher Education, and Special Education
3214 Benjamin Building
7814 Regents Drive
College Park, MD 20742
Telephone: 301.405.8384
Fax: 301.405.9995
Email: chse-admissions@umd.edu

Website: http://www.education.umd.edu/chse

Courses: EDCP EDHI EDPS HESI

Relationships: International Education Policy (HIEP) (p. 261) **Student Affairs (HISA)** (p. 387)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or MAT
- CV/Resume
- Writing Sample

To be recommended for full admission to a doctoral or master's program, a minimum undergraduate grade point average of 3.0 is required. A minimum graduate grade point average of 3.5 is required for doctoral programs. Of the three scores on the Graduate Record Examination (verbal, quantitative, analytic), at least one should be at the 70th percentile or higher for PhD applicants (40th percentile or higher for

master's applicants) and none should be under the 40th percentile for PhD applicants.

If the Miller Analogies Test is used, the score should be at least at the 70th percentile for PhD applicants (40th percentile for master's applicants). Students who do not meet one of these requirements, but show other evidence of outstanding potential, may be considered for provisional admission. For more information on admissions please refer to our website at http://www.education.umd.edu/CHSE/admissions/overview/ and click on prospective students.

It is recommended that, if possible, prospective students talk with concentration coordinators and faculty, and visit classes, to help determine if a particular concentration is appropriate to their academic interests and professional goals.

For detailed information about our programs please visit our website at http://www.education.umd.edu/CHSE/admissions/admission_criteria/.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	4 Dec

Other Deadlines: Please visit the program website at http://www.education.umd.edu/chse

Requirements

- Higher Education, Doctor of Philosophy (Ph.D.) (p. 236)
- Higher Education, Master of Arts (M.A.) (p. 236)

Facilities and Special Resources

Faculty and students in the Department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including international agencies and non-governmental organizations, provide exceptional opportunities for internships, field experiences, and research to enhance formal course experiences.

Historic Preservation, Master of Historic Preservation (M.H.P.)

Non-thesis only (capstone project required): 45 credits

The Master of Historic Preservation (MHP) requires completion of 45 credits. Required courses cover history and theory of preservation, preservation law, historical research methods,documentation, conservation, preservation economics, preservation planning & policy, group studio/workshop, internship, and independent final project. Elective courses may be taken from all contributing HISP units, and other departments with prior approval from the HISP Director. A description of the full MHP curriculum is available on the program web site at http://arch.umd.edu/hisp/historic-preservation.

Course	Title	Credits
Required courses:		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP650	Historic Preservation Studio Workshop	6
HISP655	American Vernacular Architecture	3
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP690	(Preservation Management and Practice)	2
HISP710	Final Project in Historic Preservation I	1
HISP711	Final Project in Historic Preservation II	2
HISP660	Internship in Historic Preservation	0
HISP619	Special Topics in Historic Preservation	1
Electives		9
Total Credits		45

Historic Preservation (HISP)

Graduate Degree Program
College: Architecture

Abstract

Based in the School of Architecture, Planning, and Preservation, the Historic Preservation Program is a collaboration of faculty from across the University–from the departments of American Studies, Anthropology, Architecture, History, Landscape Architecture, Real Estate Development, and Urban Studies and Planning, as well as the National Trust Library. Our shared goal is educating professionals for work in a wide range of preservation organizations. Research on historic preservation issues is also a focus of the Program, pursued through faculty and student projects, in partnership with preservation organizations and University partners. With many preservation organizations and agencies in the DC area, you will learn from well-connected faculty and challenging internships that will allow you to expand and apply your knowledge and skills. You will experience two great laboratories in Baltimore and Washington; places and spaces where you can explore gentrification, sustainability and other pressing issues. We also sit within a broad cultural landscape that extends from the Atlantic coast to the mountains of Appalachia.

The Historic Preservation Program offers a Master of Historic Preservation (MHP) degree, a graduate Certificate, and several dual degrees (with Architecture, Planning, Real Estate Development, and Anthropology). The MHP is designed as a full-time, two-year curriculum leading to a professional degree. The 45-credit MHP curriculum includes core courses, an internship, an interdisciplinary studio course, a final project, and a large selection of electives to stimulate each student's particular interests. Students will be admitted to the program with a

variety of backgrounds but with a demonstrated prior interest in the preservation field. (In some exceptional cases, students may be admitted to the program on a part-time basis.)

Financial Assistance

HISP's principal form of financial aid consists of graduate assistantships related to research and outreach activities. The assistantships consist of tuition remission as well as a stipend. In addition, the Program awards--in conjunction with local non-profit Prince George's Heritage--the Prince George's Heritage Preservation Fellowship, an annual competitive award for a HISP student or students whose Prince George's County related project is judged to be especially outstanding. Additionally, there are possibilities for paid internships and paid part-time work with a variety of national and local organizations and governmental agencies.

Contact

Contact the program at the following address:
HISP Graduate Admissions
School of Architecture, Planning and Preservation
University of Maryland
College Park, MD 20742
Or at the School of Architecture, Planning, and Preservation web site:
http://www.arch.umd.edu

Donald Linebaugh, Ph.D.
Director, Historic Preservation Program
School of Architecture, Planning & Preservation
1247 Architecture Building
3835 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6309
Fax: 301.314.9583
Email: dwline@umd.edu

Website: http://www.arch.umd.edu

Courses: AMST ANTH ARCH ARTH GEOG HISP HIST LARC RDEV URSP

Relationships: Applied Anthropology and Historic Preservation (AAHP) (p. 41) **Architecture and Historic Preservation (ARHP)** (p. 54) **Community Planning and Historic Preservation (CPHP)** (p. 132) **Historic Preservation and Real Estate Development (HPDV)** (p. 240)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample: A writing sample of at least 10-30 pages. This can be previous individual academic work or professional work. It does not necessarily have to be related to historic preservation, however a related topic is preferred. Upload to the Writing Sample of the Uploads Requirements section of the application.

All applicants must have a bachelor's degree from an accredited institution. There is no restriction on the applicants' previous field of study, and indeed we encourage diversity in all senses.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Historic Preservation, Master of Historic Preservation (M.H.P.) (p. 238)

Facilities and Special Resources

The University of Maryland's Historic Preservation Program is privileged to be part of a dynamic, successful preservation community that has long thrived throughout the state and in the District of Columbia. Opportunities to study and work abound in the incredibly diverse cities, towns, and landscapes across Maryland. In addition, the Program enjoys close relationships with many state, local, national, international and federal-government organizations working in historic preservation, as well as non-profit groups and private firms.

You will have the opportunity to combine your coursework with invaluable research and field-based professional training in documentation, policy and interpretation. Virtually every class gets you out in the field and connects you to preservation issues and practice in communities and neighborhoods. The program has an ongoing relationship with the Town of Bladensburg to use the Bostwick House property as a learning laboratory and classroom. This 1746 brick home and several farm outbuildings sit on a 10-acre parcel adjacent to the Anacostia River in the middle of suburban Bladensburg [www.bostwickhouse.weebly.com (http://www.bostwickhouse.weebly.com)] and just 10 minutes from campus.

The HISP program is directly related to and substantially enhanced by the National Trust for Historic Preservation Library, housed on the College Park campus since 1986 [http://www.lib.umd.edu/NTL/ntl.html]. This Library is one of the leading scholarly resources for preservation in the country.

The program is further strengthened by close working relationships with the Maryland Historical Trust, the National Park Service, the National Trust for Historic Preservation, the Maryland National Capital Park and Planning Commission, Historic Annapolis, Inc., Preservation Maryland, Prince George's Heritage, the Anacostia Trails Heritage Area, and others.

Practical experience can be gained through a variety of internship opportunities with these organizations and many others.

Historic Preservation and Real Estate Development, Master of Historic Preservation and Master of Real Estate Development (dual degree) (M.H.P. and M.R.E.D.)

Non-thesis only: 66 credits required

Required courses cover history and theory of preservation, preservation law, historical research methods, documentation, conservation, preservation economics, preservation planning & policy, group studio/ workshop, and independent final project.

Real Estate requirements address real estate economics, finance, planning and entitlements, design and construction management and asset and property management.

The final project must not only address historic preservation or adaptive reuse issues, but must meet the requirements of an MRED Capstone project with real estate feasibility and pro forma modelling.

Course	Title	Credits
Required courses:		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP650	Historic Preservation Studio Workshop	6
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP690		2
HISP710	Final Project in Historic Preservation I	1
HISP711	Final Project in Historic Preservation II	2
RDEV600	Principles and Practice of Real Property Development	3
RDEV603	Introduction to Real Property Finance	3
RDEV610	Real Property Development Law and Ethics	3
RDEV630	Real Property Finance and Investment	3
RDEV635	Capital Markets and Real Estate Investments for Developers	3
RDEV689	Current Topics in Real Estate Development (RDEV689F)	3
RDEV620	Market Analysis for Real Property Development	3
RDEV650	Essentials of Design and Construction Management for Development Professionals	3
RDEV660	Commercial Leasing for Real Property Developers	3
RDEV640	Principles of Urban Design for Real Property Developers	3
RDEV615	Principles, Process and Politics of Planning for Real Property Development	3
Total Credits		66

Historic Preservation and Real Estate Development (HPDV)

Graduate Degree Program
College: Architecture

Abstract

Based in the School of Architecture, Planning, and Preservation, the Historic Preservation Program is a collaboration of faculty from across the University–from the departments of American Studies, Anthropology, Architecture, History, Landscape Architecture, and Urban Studies and Planning, as well as the National Trust Library. Our shared goal is educating professionals for work in a wide range of preservation organizations. Research on historic preservation issues is also a focus of the Program, pursued through faculty and student projects, in partnership with preservation organizations and University partners.

The dual degree program in Historic Preservation and Real Estate Development is a 60 credit program that can be completed, by taking courses full time over 5 semesters (2 1/2 years), including at least one winter and summer term course. While not preferred students may be admitted to the program on a part-time basis. Consult with the HISP Program Director.

The final project for the HISP portion of the degree will also have to meet the requirements for a Capstone Project in real estate development and should be discussed early on with each Program Director to be sure it will meet the requirements of both.

Financial Assistance

HISP's principal form of financial aid consists of graduate assistantships related to research and outreach activities. The assistantships consist of tuition remission as well as a stipend. In addition, the Program awards-- in conjunction with local non-profit Prince George's Heritage--the Prince George's Heritage Preservation Fellowship, an annual competitive award for a HISP student or students whose Prince George's County related project is judged to be especially outstanding. Additionally, there are possibilities for paid internships and paid part-time work with a variety of national and local organizations and governmental agencies.

The Colvin Institute provides scholarship funds to a number of highly qualified students each term. Scholarship determinations are made at the time of application and admission. Scholarships are generally awarded on a per course basis and commitments are made at the time of admission and apply for the duration of the entire program, subject to academic performance.

The MRED Program offers a limited number of administrative graduate assistantships to full time MRED students. Contact the Program Director to apply. Periodically there are named scholarships provided by various real estate organizations or development companies.

In addition, there are work opportunities both on, and off campus, and they are relatively plentiful. Students in the past have been successful in finding part time internships and full time work with local real estate companies. The MRED student listserv posts openings periodically

as they are brought to the attention of the Program by alumni, friends, faculty and sponsors.

Applicants should inquire as to the availability of scholarship funding for the term they are starting. Scholarships are typically for a portion of tuition only, and are paid on a per course basis as students progress through the program. Scholarships are available to part time, full time, and dual degree students.

Contact

Find additional information on program offerings, degree requirements, admissions, and financial aid on the School's Web site (www.arch.umd.edu).

Schedule a visit and tour online at: http://www.arch.umd.edu/students/advising/. Be sure to contact the Program Director for real estate development (mdaymars@umd.edu) if you wish to attend a sampling of classes while here.

For further information about the Preservation Program, please contact Don Linebaugh, dwline@umd.edu, 301.405.6309.

For further information about the Real Estate Development Program and the Colvin Institute, please contact Maria Day-Marshall, JD, LLM, Clinical Associate Professor and Director of Graduate programs in Real Estate Development and the Colvin Institute of Real Estate Development, mdaymars@umd.edu.

Additional information on Case competitions, samples of student work, as well as syllabi and adjunct faculty can be found at the School's website (http://www.arch.umd.edu. You will also find the Colvin Institute offering outreach and information at the ICSC in Las Vegas each May, at the ULI National Conference each October, and at many local events of Bisnow, ICSC, ULI, CREW, WIRRE and HAND.

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Maria Day-Marshall, JD, LLM
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School of Architecture, Planning & Preservation
Real Estate Development Program
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3835 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8000
Email: mdaymars@umd.edu

Website: http://www.arch.umd.edu

Relationships: American Studies (AMST) (p. 34)

Admissions

General Requirements

- Statement of Purpose: Statement of Purpose – In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Law School Admissions Test (LSAT)
- CV/Resume
- Skills Assessment (in the online application): This assessment is not used in determining your admission to the program. Self assessments are used for placing students into the proper sequence of courses once admitted.
- Writing Sample: A writing sample of at least 10-30 pages. This can be previous individual academic or professional work. It does not necessarily have to be related to historic preservation or real estate, however a related topic is preferred. The writing sample should demonstrate the ability to analyze a problem/question and clearly communicate your findings. Upload to the Writing Sample of the Uploads Requirements section of the online application.
- Must be admitted by both programs to pursue dual degree.

All applicants must have a bachelor's degree from an accredited institution. There is no restriction on the applicants' previous field of study, and indeed we encourage diversity in all senses.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Historic Preservation and Real Estate Development, Master of Historic Preservation and Master of Real Estate Development (dual degree) (M.H.P. and M.R.E.D.) (p. 240)

Facilities and Special Resources

The School of Architecture, Planning, and Preservation and the Colvin Institute of Real Estate Development are ideally located between Washington, DC, and Baltimore and surrounded by a number of

historic communities and a varied physical environment. The resulting opportunity for real estate development and historic preservation study is unsurpassed.

Close by the University are key historically important and interesting places in the development of U.S. communities, including the 4th settlement in America at Historic St. Mary's City in Southern Maryland, which was the first planned city in America. Just 10 minutes from campus is the 1930s new town of Greenbelt, Maryland, and within 45 minutes are the 1960's new towns of Columbia, Maryland, St. Charles, Maryland and Reston, Virginia. One of the best examples of new urbanism is the Kentlands development less than 30 minutes away. And not to be missed are the major redevelopment and urban living revivals in the Port City of Baltimore and the historic neighborhoods of Anacostia and Columbia Heights in the District of Columbia.

The University of Maryland's Historic Preservation Program is privileged to be part of a dynamic, successful preservation community that has long thrived throughout the state and in the District of Columbia. Opportunities to study and work abound in the incredibly diverse cities, towns, and landscapes across Maryland. In addition, the Program enjoys close relationships with many state, local, national, international and federal-government organizations working in historic preservation, as well as non-profit groups and private firms.

The HISP program is directly related to and substantially enhanced by the National Trust for Historic Preservation Library, housed on the College Park campus since 1986 [http://www.lib.umd.edu/NTL/ntl.html]. This Library is one of the leading scholarly resources for preservation in the country. The program is further strengthened by close working relationships with the Maryland Historical Trust, the National Park Service, the National Trust for Historic Preservation, the Maryland National Capital Park and Planning Commission, Historic Annapolis, Inc., Preservation Maryland, Prince George's Heritage, the Anacostia Trails Heritage Area, and others. Practical experience can be gained through a variety of internship opportunities with these organizations and many others.

The School's resources include a model shop, a digital fabrication lab, and both PC and MAC computer labs with REVIT, ARGUS, GIS, Maptitude and other design programs available. The School's library contains some 57,000 monographs and 6,000 current periodicals, making it one of the major architectural libraries in the nation. The National Trust Library for Historic Preservation, housed in McKeldin Library, contains 11,000 volumes and 450 periodical titles. THe Colvin Institute holds the entire library offerings of the Urban Land Institute and access to all the case studies published by ULI. The slide collection includes approximately 430,000 slides on architecture, landscape architecture, planning, and technical subjects. The interdisciplinary National Center for Smart Growth Education and Research is based in the School offering perspectives and opportunities to engage important issues facing urban and regional planning.

Both the Real Estate Development and Historic Preservation Programs benefit from the strong support of the professional community, including practitioners who bring expertise into the class room and project courses as instructors and advisors. The RDEV courses are all taught by working or retired real estate professionals giving unparalleled access for students to making connections with current practice in the industry.

Job placement for HISP graduates has been outstanding with graduates sought out by national, local and regional firms and agencies. The over 150 alumni of the real estate program have a very active and passionate group of grads in the area who meet regularly and share practice tips, connections and future job opportunities.

Historic Preservation, Post-Baccalaureate Certificate (P.B.C.)

16 credits required

Certificate students, in conjunction with their degree programs, complete the required introductory seminar (HISP600), a survey of preservation law, 15 credit hours of core courses, and the final seminar (HISP701). The total number of semester credit hours will vary according to the particular requirements of the specific degree program.

Course	Title	Credits
Required courses:		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
or HISP655	American Vernacular Architecture	
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP701	Certificate Portfolio Project	1
Electives		6
Total Credits		16

Historic Preservation (Z005)

Graduate Certificate Program
College: Architecture

Abstract

The historic preservation certificate program is designed to provide students in allied graduate programs (for example, American studies, anthropology, history, landscape architecture, planning, real estate development, and architecture) at the College Park campus with a basic understanding of the discipline of historic preservation with an emphasis on connecting preservation practice with their home discipline.

Contact

Donald Linebaugh, Ph.D.
Director, Historic Preservation Program
School of Architecture, Planning & Preservation
1247 Architecture Building
3835 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6309
Fax: 301.314.9583
Email: dwline@umd.edu

Website: http://www.arch.umd.edu

Relationships: Historic Preservation (HISP) (p. 238)

Admissions

This program is only available to students currently enrolled in a graduate degree program at the College Park campus. For example, students pursing a MA or PhD in history or a MArch in Architecture may complete

a certificate in historic preservation. Please contact the department for more information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please see the program website	Please see the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please see the program website	Please see the program website

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Historic Preservation, Post-Baccalaureate Certificate (P.B.C.) (p. 242)

Facilities and Special Resources

See Master of Historic Preservation (HISP) for more information.

History, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Organized in the 1920s, the Master of Arts in History program at the University of Maryland provides broad and intensive instruction in bibliography, research, and writing in various fields of historical study. The MA degree may constitute a step toward doctoral research or preparation for a variety of other fields, such as archives administration, museum scholarship and exhibitions, public history, primary or secondary school teaching, law, or international relations.

Admission to the Master of Arts program is offered to highly qualified applicants holding at least a bachelor's degree, normally in history or a related discipline. Application and admissions procedures are described on the Department's website.

The MA degree program requires a total of thirty (30) semester hours of course work and research credits and the submission of one or two original research papers. In addition, MA students must successfully defend a thesis (the Degree-by-Thesis option) or pass a written examination (the Degree-by-Examination or 'non-thesis' option).

The anticipated period for completion is two (2) years of full-time study. The degree must be completed within five (5) years.

Thesis Option

Course	Title	Credits
HIST601	History and Contemporary Theory	3
Approved major field courses		9
HIST8xx Research Seminar		3
Electives		9
HIST799	Master's Thesis Research	6
Total Credits		30

Non-thesis Option

Course	Title	Credits
HIST601	History and Contemporary Theory	3
Approved major field courses		6
HIST8xx Research Seminar		6
Electives		15
Submit two research papers		
Total Credits		30

History, Doctor of Philosophy (Ph.D.)

Doctoral students must complete 42 credits including 12 credits HIST899. Students must also pass a language exam, pass the Major Field written exam, an oral exam, and pass the Prospectus Defense.

First awarded in 1937, the Doctorate in History at the University of Maryland is conferred for superior achievement in historical study and research. The major portion of the degree is the dissertation, an original and noteworthy contribution to historical knowledge. In anticipation of this research, students must master the historical literature in their fields, bibliographic tools, research and writing methods, and general, special, and minor fields of study. Competence in these preliminary steps will be measured by successful completion of course work and by comprehensive examinations.

Unless they have taken comparable courses elsewhere, students must complete the general seminar(s) in their major field, HIST601 (History and Contemporary Theory), a minimum of nine hours of reading courses, six hours of research seminars, and nine hours in a minor field.

Depending on the field of study, doctoral students may be required to demonstrate competence in one or more foreign languages and/or special skills.

Students who enter with a master's degree in history or a related field are expected to sit for a set of written and oral comprehensive examinations within five semesters. Those who enter with a bachelor's degree typically take the comprehensive exams within six semesters. Upon successful completion of all examinations, doctoral students are expected to prepare a dissertation prospectus and advance to doctoral candidacy within one or two semesters. Upon completion of the dissertation research and writing, candidates defend the dissertation in an oral examination.

The requirements for the doctoral degree are intended to be completed in five to six years. For more information, see the History Department website.

Course	Title	Credits
HIST601	History and Contemporary Theory	3
General Seminar in Major Field		3
Three readings courses in Major Field		9
Three readings courses in the Minor Field		9
Two Research Seminars		6
Dissertation Research Requirement		
HIST899	Doctoral Dissertation Research	12
Total Credits		42

History (HIST)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of History offers programs leading to the degrees of Master of Arts and Doctor of Philosophy. In conjunction with the College of Information Studies, the Department of History also offers a dual-degree Master of Arts in History and Library Science.

Major fields of concentration for the MA and PhD programs are: Ancient Mediterranean, Medieval, Early Modern Europe, Modern Europe, Global Interaction and Exchange, International, Jewish, Latin America, Middle East, Russia & Eurasia, Technology, Science, & Environment, the United States, and Women & Gender. MA-only fields are: Africa and Military. The graduate program, which includes over fifty regular faculty members and approximately 150 degree-seeking students, excels in the following subfields: African-American, US, and Middle East. Other areas of established strength are Western and Central Europe, Russia and Eurasia, Ancient Mediterranean, Latin American, and Women & Gender. More recently, the following fields have emerged as centers of growing faculty strength and are attracting increasing numbers of students and faculty: Atlantic history, the African diaspora, and Global Interaction and Exchange.

The students in our three-degree programs come from across the nation, from small liberal arts colleges and major research institutions, as well as from Europe, Canada, East Asia, Eurasia, and Latin America. History students have won a number of major external fellowships, including the ACLS/Mellon Early Career Fellowship, the Fulbright-Hays Doctoral Research Fellowship, the Berlin Program for Advanced German and European Studies Dissertation Fellowship, the Foundation for the Research and Study of the East German Dictatorship Fellowship, the Fulbright-IIE Student Grant, the International Research & Exchanges Board Fellowship, the Mary Savage Snouffer Dissertation Fellowship, the Library Company of Philadelphia Fellowship, the Maryland Historical Society Lord Baltimore Research Fellowship, the Massachusetts Historical Society Research Fellowship, the Center for Jewish History Fellowship, and the Mellon Fellowship for Dissertation Research in Original Sources.

Recent graduates have started postdoctoral fellowships or tenure-track jobs at institutions that include Case Western University, George Washington University, Bucknell University, Claremont-McKenna College,Christopher Newport University, Morgan State University, Johns Hopkins University, Monash University, Appalachian State University, Montclair State University, Ohio University, Rhode Island College, SUNY Purchase, the United States Naval Academy, the University of South Florida, Framingham State University, the University of Southern Mississippi, and Western Washington University. The members of our extended alumni community, numbering more than 300 master of arts and doctoral recipients, work as professional historians throughout the State of Maryland, in a number of United States Government agencies, and at institutions of higher education and historical research across the United States and the globe.

Financial Assistance

The Department of History administers several forms of financial assistance for graduate students, including fellowships, teaching assistantships, graduate assistantships, research assistantships, and research grants. All fellowships, assistantships, and grants are awarded on the basis of merit, as determined by the Graduate Committee, upon the recommendation of faculty and the Director of Graduate Studies.

A multiyear guarantee of continuous funding is frequently offered to newly matriculating PhD students. Guaranteed funding is not standard for students entering the MA and HiLS programs.

Funding packages typically include one or two years of fellowship and three years of Teaching Assistantship. The packages include tuition remission and a health benefits option, subject to satisfactory progress towards the fulfillment of program requirements. Some funding packages are just for four years of continuous Teaching Assistantships. All teaching assistants receive tuition remission and a health benefits option.

For FY2016 (2015-16 academic year), the pay scale for 9.5-month teaching, graduate, and research assistantships range between $18,028 and $18,755. Fellowships follow a similar pay scale. Assistantships and fellowships include tuition remission and a health benefits option. Variations in stipend amounts are due to a number of factors, including the type of appointment, international student status, previous appointments, and advancement to candidacy.

Additional funding is available through the Arts and Humanities Research and Travel Grant competition, Department semester dissertation fellowships, the summer Prospectus Development Grant competition, matching funds for travel to academic conferences, and various campus-wide funding competitions. All doctoral students are expected to seek outside funding for pre-dissertation and dissertation research, as appropriate.

History graduate students may seek grants and fellowships, assistantships, hourly employment, and other forms of self-support offered by non-departmental sources.

Contact

Ahmet Karamustafa, Ph.D.
Professor and Director of Graduate Studies
Department of History
2131 Francis Scott Key Hall
4282 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.4267
Fax: 301.314.9399
Email: akaramus@umd.edu

Website: http://www.history.umd.edu

Courses: HIST

Admissions
General Requirements

- Statement of Purpose: Other than the required questions for the Statement of Purpose asked by the University of Maryland, the History Department asks applicants to include content that emphasizes academic and research interests:
  a. what is the applicant interested in studying and why,
  b. what the applicant might be interested in working on for the M.A. thesis or Ph.D. dissertation and

c. how the applicant's prior education has provided good training for graduate work in the particular field of interest.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample: Research paper of about 20 pages, uploaded to the Upload Requirements section of the application.

As a demonstration of our commitment to excellence in historical scholarship and education, admission to our degree programs is highly competitive. It is important that each applicant clearly articulate his/her academic preparation and qualifications for graduate study at Maryland. All prospective applicants are encouraged to make contact with the faculty in the area(s) of interest. Faculty play an important role in the admissions decision. Prospective applicants are also encouraged to make contact with current graduate students to learn more about their experiences. The History Graduate Student Association can facilitate communications with current students.

Although there are exceptions, the minimum overall grade point average is 3.25 for admission to a master's degree program and 3.50 for admission to the doctoral program. The admissions committee would typically expect a higher grade point average in past coursework in history and related disciplines. Successful applicants usually score above the 80th percentile in the analytical writing and verbal reasoning portions of the Graduate Record Examination (GRE) General Test. The Department does not require a GRE Subject Test.

There is no language requirement for the MA degree, but the command of one or more languages is required for admission into the PhD program in some fields within History. For more information on language requirements, see the History Department website.

The admissions process is sensitive to variations in GRE scores among applicants whose primary language is not English. However, the University requires that all admitted students demonstrate proficiency in written and spoken English.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	14 Dec

Other Deadlines: Please visit the program website at http://www.history.umd.edu

Requirements

- History, Doctor of Philosophy (Ph.D.) (p. 243)
- History, Master of Arts (M.A.) (p. 243)

Facilities and Special Resources

In addition to the field concentrations described above, the Department of History offers several forms of specialized training, including certificate programs in Museum Scholarship & Material Culture, co-sponsored by the Department of American Studies, and Historic Preservation, co-sponsored by the School of Architecture.

The Nathan and Jeanette Miller Center for Historical Studies, housed within the Department, promotes both research and graduate training by sponsoring seminars and colloquia, major scholarly conferences, and visiting professors who teach graduate courses. Typically, the Center's activities each year concentrate on a historical theme of surpassing interests that cuts across the usual chronological and cultural boundaries.

The University of Maryland is home to a number of important archives, special collections, and historical editing projects, including the archives of the American Federation of Labor-Congress of Industrial Organizations (AFL-CIO), the Freedmen and Southern Society Project and the Samuel Gompers Papers, the Library of American Broadcasting, the Gordon W. Prange Collection, and the National Trust for Historic Preservation Library. The Combined Caesarea Expeditions, an archeological project that joins excavation of the terrestrial remains of Caesarea Maritima with underwater investigation of the site's ancient harbor, are coordinated at Maryland.

The University sponsors a number of significant scholarly publications of interest to historians, including the *Hispanic American Historical Review*, the flagship English-language journal in Latin American history; and *Feminist Studies*, a pioneer in women's history and gender studies.

The College Park campus is located within the Washington-Baltimore corridor, one of the nation's most dynamic regions for historical research. Francis Scott Key Hall, home to the Department of History, sits less than ten minutes from Archives II, the U.S. government's largest repository, and less than thirty minutes from downtown Washington, D.C., a city of unparalleled cultural resources and unique opportunities for historical research, including the Library of Congress, the Folger, and the US Holocaust Memorial Museum. Annapolis and Baltimore, home to significant archival holdings related to the history and cultures of the State of Maryland, the greater Chesapeake Bay region, and the Atlantic world, can be reached in less than forty-five minutes.

History and Library & Information Science, Master of Arts and Master of Library and Information Science (dual degree) (M.A. and M.L.I.S.)

Thesis option: minimum of 54 credits
Non-thesis option: minimum of 54 credits

Students must complete a minimum of 24 credits in the Department of History and a minimum of 24 credits in the College of Information Studies. Students have the option of specializing in one of the iSchool's specializations: Archives and Digital Curation, Community Analytics and

Policy, Youth Experience, Diversity and Inclusion, or an Individualized Program Plan. Students completing a thesis must take 6 credits of HIST799.

Course	Title	Credits
Library and Information Science requirements:		
LBSC602	Serving Information Needs	3
LBSC631	Achieving Organizational Excellence	3
LBSC671	Creating Information Infrastructures	3
LBSC791	Designing Principled Inquiry	3
LBSC703	Field Study in Archives and Digital Curation	3
or LBSC707	Field Study in Information Service	
iSchool electives		9
History requirements:		
HIST601	History and Contemporary Theory	3
Approved major field courses		12
Minimum of 3 credits in a General Seminar or Major Field		3
HIST8xx Research Seminar		3
Remainder of coursework		9
Total Credits		54

History and Library & Information Science (HILS)

Graduate Degree Program
College: Information Studies / Arts and Humanities

Abstract

The History and Library Science (HiLS) dual-degree program is the result of a cooperative agreement between the College of Information Studies, (Maryland's iSchool) and the Department of History. HiLS students graduate with both a Master of Arts in History and a Master of Library and Information Science (MLIS) degree.

The HiLS program is ideally suited for students interested in gaining a multidisciplinary perspective to research as well as practical hands-on skills. Because of the proximity of the College Park campus to a variety of immensely rich research collections, students are able to gain first-hand experiences through internships that reinforce their classroom instruction. As a result of the dual-degree studies, students in the HiLS program gain skills in historical methodology and cutting-edge library and information science practices, preparing them for careers in libraries, archives, museums, and other information centers in the public, private, and non-profit sectors.

Students admitted to the HiLS Program typically complete the program of study in three (3) years, however they have up to five (5) years to complete the degrees. The HiLS program requires fifty-four (54) credit hours of study, with a minimum of twenty-four (24) hours in both the Department of History and the College of Information Studies. Students select how to use the remaining six (6) credits.

The MA and the MLIS are awarded simultaneously, and a student who fails to complete the special requirements for the coordinated degree programs may not receive either degree. When a student admitted to the HILS program subsequently wishes to receive only one degree, he/she must transfer from HILS either to the graduate program in History or to the College of Information Studies and fulfill the normal requirements for the separate master's degree. The dual-degree History and Library Science offers the option of a degree-by-thesis (History and iSchool) as well as a degree-by-examination (History).

Financial Assistance

The College of Information Studies and the Department of History make available a limited number of teaching and/or graduate assistantships for master's students, including students in the HILS dual-degree program. These assistantships are awarded on the basis of merit, staffing needs, and budget. Neither academic unit extends guaranteed awards.

For more information on financial aid options from the College of Information Studies, please visit the Financial Aid section of the College of Information Studies website. (http://ischool.umd.edu)

Contact

College of Information Studies
Student Services Office
Room 4110 Hornbake Library Building, South Wing
University of Maryland
College Park, MD 20742-4345
Telephone: 301.405.4915
Email: ischooladvisors@umd.edu

Ahmet Karamustafa, PhD
Professor and Director of Graduate Studies
Department of History
2131 Francis Scott Key Hall
4282 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.4267
Fax: 301.314.9399
Email: akaramus@umd.edu

Websites: http://www.history.umd.edu or http://www.ischool.umd.edu

Courses: HIST INFM INST LBSC

Keywords: Multidisciplinary graduate training for archivists, records managers, manuscript curators, rare book librarians, bibliographers, conservation administrators, and those wishing to become subject and research specialists in academic, special, and/or research libraries.

Relationships: Human-Computer Interaction (HCIM) (p. 248) **Information Management (INFM)** (p. 253) **Information Management (online) (MIMO)** (p. 255) **Information Studies (INFS)** (p. 256) **Library and Information Science (LBSC)** (p. 276) **Library and Information Science (online) (LBSO)** (p. 278)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application Essay (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationhils.pdf)
- Writing Sample
- Employment history

Students must apply for admission to both the Department of History and the College of Information Studies under the rubric HILS (History and Library Science). There is one, consolidated application, but two, independent admission decisions. An offer of admission from both, the Department of History and the College of Information Studies is required in order to be admitted to the dual-degree program.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	11 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	11 Jan

Other Deadlines: Please visit the program website at http://www.history.umd.edu or http://www.ischool.umd.edu

Requirements

- History and Library & Information Science, Master of Arts and Master of Library and Information Science (dual degree) (M.A. and M.L.I.S.) (p. 245)

Facilities and Special Resources

The College of Information Studies operates five research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), and the Digital Curation Innovation Center. iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, and the College of Education. The College also operates a student computer lab for currently enrolled students. Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory, and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Housing, Finance & Development, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Housing, Finance & Development (Z007)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Housing, Finance & Development, Post-Baccalaureate Certificate (P.B.C.) (p. 247)

Human-Computer Interaction, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option: 30 credits

The Master of Science in Human Computer Interaction (HCIM) is a unique cross disciplinary degree program that integrates information studies, computer science, education, psychology and engineering to prepare future HCI leaders in industry, government, education and other sectors. Through coursework and research experiences, students in this program will develop skills in the fundamentals of HCI, advanced research methods, usability analysis and testing, social computing strategies and technologies, and technology design.

HCIM students devise a plan of study to meet graduation requirements: three core courses, a required research methods course and internship experience, a thesis or capstone project, and three elective courses for a total of 30 credit hours. Students will take 9 credits of elective courses in the

following areas: Information Policy, Information Ethics, Users and Use Context, Information and Universal Usability, Information Environments.

Students who wish to complete a thesis should enroll in six credits of INST799. These credits must be taken as 3 credits in the fall of the student's final year and 3 credits the following spring.

Students who wish to complete a capstone project should enroll in INST775 (3 credits) and INST776 (3 credits). These courses must be taken consecutively in the fall and spring of the student's final year.

Course	Title	Credits
INST630	Introduction to Programming for the Information Professional	3
INST632	Human-Computer Interaction Design Methods	3
INST633	Analyzing Social Networks and Social Media	3
INST717	Internship Practicum in Human-Computer Interactions	3
Research Methods course		3
Elective courses		9
Thesis or Non-Thesis Requirements		
Select one of the following:		6
Thesis:		
INST799	Master's Thesis Research	
Non-Thesis:		
INST775	HCIM CAPSTONE PREP	
INST776	HCIM CAPSTONE PROJECT	
Total Credits		30

Human-Computer Interaction (HCIM)

Graduate Degree Program
College: Information Studies

Abstract

In the HCIM program, students learn to design, evaluate, and implement new information technologies that are understandable, usable, and appealing to a wide variety of people. Our students develop a fundamental understanding of the technology design process, tool-building technologies, evaluation techniques, application areas for users, and the social impact of technology on the individual and community. The program prepares students to become human-computer interaction (HCI) leaders in industry and government, or to become successful in doctoral work in a particular specialization of HCI.

Our 30-credit program is typically completed in two years by full-time students, while offering flexibility to accommodate part-time and professional students. Our core curriculum grounds students in the fundamentals of HCI perspectives and methodologies, while electives offer in-depth insight into specialized areas of the field. A required internship experience provides a unique opportunity to gain hands-on experience in industry or research environments, and the choice of an individual thesis or a client-based team capstone project allows students to demonstrate the skills they've acquired in the form best suited to their career goals.

Financial Assistance

The HCIM program is not able to offer applicants financial aid on admission. Many of our students apply for and secure graduate assistantships after being admitted to the program, but these positions are administered by individual faculty, departments, and offices, not by the program itself. For more information about scholarships and financial aid offered by the College of Information Studies, please see here (http://ischool.umd.edu/tuition-fees).

Contact

For more information about applying to the HCIM program (http://ischool.umd.edu/hcim-admissions), please contact the iSchool Student Services Office at ischooladmission@umd.edu.

Please visit the College of Information Studies website (http://ischool.umd.edu) for details on upcoming Information Sessions (https://ischool.umd.edu/admissions/information-sessions) or Open House programs.

iSchool Student Services Office
4110 Hornbake Building, South Wing
4130 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2038
Email: ischooladmission@umd.edu

Website: http://www.ischool.umd.edu/hcim

Courses: INFM INST

Relationships: Information Management (INFM) (p. 253) **Information Studies (INFS)** (p. 256) **Library and Information Science (LBSC)** (p. 276) **Library and Information Science (online) (LBSO)** (p. 278)

Admissions

General Requirements

- Statement of Purpose (https://app.applyyourself.com/_fileroot/clnt-1072/umdstatementofpurpose.pdf)
- Transcript(s): Uploading unofficial transcripts is sufficient for the purposes of the application review process. However, if you are offered admission and choose to enroll in the University of Maryland, you will need to provide an official and unopened transcript.
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE): GRE scores are optional for domestic applicants, and required for international applicants. Any requests to waive the GRE requirement will be evaluated on a case-by-case basis by the program committee. Applicants may also submit GMAT scores instead of GRE scores. GMAT scores may also be submitted instead of GRE scores (please notify the department if you will be sending GMAT scores). Please send any requests to hcim@umd.edu.
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationhcim.pdf)

All applicants to the College of Information Studies must meet the minimum requirements set by the University of Maryland Graduate School.

- Applicants must have earned a four-year baccalaureate degree from a regionally accredited U.S. institution, or an equivalent degree from a non-U.S. institution.
- Applicants must have earned a minimum 3.0 average GPA (on a 4.0 scale) in all prior undergraduate course work.
- Applicants must provide an official copy of a transcript for all their post-secondary work.

Admission to the HCIM program is competitive. Applicants are evaluated for admission to the program based primarily on academic achievement (GPA and prior coursework) and admissions essays. TOEFL score should be 100 or higher. GRE should be in the 40th percentile or higher for Verbal scores and in the 60th percentile or higher for Qualitative scores.

For more admissions information or to apply to the program, please visit the Graduate School website (https://www.gradschool.umd.edu/admissions).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Feb

Other Deadlines: Please visit the program website at http://www.ischool.umd.edu/hcim

Requirements

- Human-Computer Interaction, Master of Science (M.S.) (p. 247)

Facilities and Special Resources

The College operates six research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), the Trace Center, and the Digital Curation Innovation Center (DCIC).

iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, the College of Education, and the Philip Merrill College of Journalism.

Human Development, Master of Arts (M.A.)

Thesis or Non-thesis option: 30 credits

The M.A. program requires 30 credit hours and offers both a thesis option (24 hours of courses plus 6 hours of thesis) and a non-thesis option (24 hours of courses plus 6 hours of supervised placement in an organization and accompanying papers).Courses in biological, social, cognitive, and personality development and in quantitative methods and a written comprehensive examination are required for all master's degrees.

Course	Title	Credits
Required courses:		
EDHD690	Theoretical Foundations of Human Development	3
EDMS645	Quantitative Research Methods I	3
EDHD720	Social Development and Socialization Processes	3
EDHD721	Cognitive Development and Learning: An Introduction	3
EDHD775	Human Development and Neuroscience	3
Thesis or Non-Thesis Requirements		
Select one of the following:		15
Thesis:		
EDMS646	General Linear Models I	
EDHD799	Master's Thesis Research	
Two electives approved by advisor		
Non-Thesis:		
EDHD789	Internship in Human Development	
Three electives approved by advisor		
Total Credits		30

Human Development, Master of Education (M.Ed.)

Non-thesis only: 30 credits required

The Master of Education degree in Human Development has the following requirements: Minimum of 30 semesters of coursework, including EDMS645. A minimum of 15 hours in courses numbered 600-800, with the remainder in the 400 series or above. Required courses focus on biological, social, cognitive, and personality development and in quantitative methods. A written comprehensive examination and seminar paper are required to be taken at the end of the coursework.

The Off Campus Master of Education program curriculum is designed to respond to developmental and motivational challenges faced by teachers and other professionals who work with children and adolescents in education settings. This is not a certification program. The program uses a cohort model. Each fall a new cohort of students begins the program, which runs for two years, including one summer semester. To graduate students must successfully complete 30 credits of study and a seminar paper. Classes are held off campus, primarily at the Universities at Shady Grove. For More information, please visit http://www.education.umd.edu/HDQM/academic/degreeListings/InformationPacketOffCampMED.pdf.
The Masters Cohort in Human Development (MCHD) off-campus program deadlines

Course	Title	Credits
Required courses:		
EDHD690	Theoretical Foundations of Human Development	3
EDMS645	Quantitative Research Methods I	3
EDHD720	Social Development and Socialization Processes	3
EDHD721	Cognitive Development and Learning: An Introduction	3
EDHD775	Human Development and Neuroscience	3

Select five of the following:		15
EDHD711	Peer-Culture and Group Processes in Human Development	
EDHD750	Culture, Context, and Development	
EDHD779	Selected Topics in Human Development	
EDHD835	The Development of Achievement Motivation	
EDHD840	Language and Literacy Development	
EDHD850	Social Cognition and Moral Reasoning	
Total Credits		30

Human Development, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 72 credits, including 12 credits of EDHD899. Students can specialize in either Educational Psychology or Developmental Science, and must complete an Independent Emprical Research Project as well as The Doctoral Comprehensive Knowledge Portfolio.

The Ph.D. degree requires 72 hours of credit which includes 12 dissertation credits. Courses in biological, social, and cognitive development and in intermediate statistics and research methods are required. Students also receive credit for research experiences. Slight modifications of these requirements characterize the Specializations in Educational Psychology and Developmental Sciences. Students are also required to complete a comprehensive examination portfolio prior to advancement to candidacy.

Course	Title	Credits
Required courses:		
EDMS651	General Linear Models II	3
EDHD780	Research Methods in Human Development	3
EDHD888	Apprenticeship in Human Development Research	12
Dissertation Research Requirement		
EDHD899	Doctoral Dissertation Research	12
Specialization Requirements		
Select one of the following:		42
Educational Psychogy		
Developmental Science		
Total Credits		72

Specialization Requirements Educational Psychology

Course	Title	Credits
EDHD760	Advanced Educational Psychology	3
EDHD835	The Development of Achievement Motivation	3
Select two of the following:		6
EDHD720	Social Development and Socialization Processes	
EDHD721	Cognitive Development and Learning: An Introduction	
EDHD775	Human Development and Neuroscience	
Electives approved by advisor		30
Total Credits		42

Developmental Science

Course	Title	Credits
EDHD690	Theoretical Foundations of Human Development	3
EDHD720	Social Development and Socialization Processes	3
EDHD721	Cognitive Development and Learning: An Introduction	3
EDHD775	Human Development and Neuroscience	3
EDHD840	Language and Literacy Development	3
EDHD629	Seminar for the Center for Children, Relationships, and Culture	6
Electives approved by advisor		21
Total Credits		42

Human Development (EDHD)

Graduate Degree Program
College: Education

Abstract

The purposes of the Human Development graduate programs are to contribute to basic knowledge about human development and learning and apply this knowledge in various settings. The general areas of human development covered in courses and research include infant and early childhood development, child development, and adolescent development. Specific faculty areas of expertise and research include achievement motivation, cognitive development, developmental neuroscience, early childhood policy, language development, literacy development, peer relationships, teacher-student relationships, moral development, social development, temperament, parenting, prejudice and discrimination, and the role of culture on many aspects of development.

Graduate programs in Human Development lead to the Master of Education, Master of Arts, and Doctor of Philosophy degrees. The research-oriented M. A. (with thesis) and the Ph.D. degree programs in human development are designed to develop students' scientific knowledge of human development and ability to carry out original research projects. The M.Ed. and M.A. without thesis programs are designed to develop competencies in identifying implications of the scientific knowledge of human development for specific situations and contexts, particularly elementary and secondary schools.

Human Development offers two specialization areas of study at the doctoral level, Educational Psychology and Developmental Sciences. The graduate programs and specializations prepare graduates for faculty positions at universities or research positions at institutions where research in developmental science and educational psychology is conducted. Graduates of our program have obtained positions as university professors, research scientists, program analysts, and other research-oriented occupations including research-oriented professionals in private, policy, or advocacy organizations.

Financial Assistance

Students requesting consideration for Financial Aid, in addition to completing the financial aid form found in the Graduate Admissions application, must submit their application by the priority deadline. All students who submit their application by December 15 will automatically be reviewed for any departmental aid. University fellowships, NIH traineeships, and Departmental assistantships are awarded on a competitive basis – more students are admitted than can be awarded

funding. In recent years, only students with undergraduate GPA's of 3.6, GRE scores above the 70th percentile, and strong letters of recommendation from academic references have been successful in obtaining Recruitment Fellowships sponsored by the Graduate School and graduate assistantships in the Department.

First priority for Departmental assistantships goes to students already admitted to the Department who have been assured financial assistance for the full course of their study. Almost all awards of fellowships and assistantships are based on previous academic performance, with little attention to need. In addition, some faculty have external grants which provide support for graduate students. Students who do not receive a fellowship or assistantship from the Department may contact the University Financial Aid office at 301-314-9000 for information about other sources of financial support.

Contact

Jannitta Graham
Graduate Coordinator
Department of Human Development and Quantitative Methodology
3304 Benjamin Building
3942 Campus Drive
Universtiy of Maryland
College Park, MD 20742
Telephone: 301.405.8432
Fax: 301.405.2891
Email: humandev@umd.edu

Website: http://www.education.umd.edu/HDQM/

Courses: EDHD EDUC

Keywords: Study in the broad fields of knowledge concerned with human growth, development, learning and behavior from infancy through adolescence. Areas of specialization in Educational Psychology and Developmental Science are available at the doctoral level.

Relationships: Neurosciences and Cognitive Science (NACS) (p. 316)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s): Please note: EDHD requires all applicants to submit official transcripts (hard copies) to: University of Maryland, College Park, Enrollment Services Operation/Graduate Admissions, Room 0130 Mitchell Building, College Park, MD 20742
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)

The College of Education and Graduate School require a minimum GPA of 3.0 (on a 4.0 scale) at the undergraduate level. At the master's level, a minimum GPA of 3.5 is required by the College of Education. The general Graduate Record Exam (GRE) is required by the Department. Three letters of recommendation including evidence of academic potential from university faculty references are required. In addition, students must write a statement of purpose which indicates a match between student research interests and faculty expertise. Students should indicate their research interests, describe any relevant research experience,and how their experience and interests can be met by our program.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred: 29 Nov / Final: 1 Mar	Preferred: 30 Aug / Final: 28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Preferred: 15 Nov / Final: 1 Feb	Preferred: 30 Aug / Final: 28 Sep

Other Deadlines: Please visit the program website at http://www.education.umd.edu/HDQM/

Requirements

- Human Development, Doctor of Philosophy (Ph.D.) (p. 250)
- Human Development, Master of Arts (M.A.) (p. 249)
- Human Development, Master of Education (M.Ed.) (p. 249)

Facilities and Special Resources

The Washington, D.C. area and the University of Maryland are rich in resources for graduate study in human development. The faculty of the Department is multi-disciplinary, representing the broad range of developmental sciences, educational psychology, and related fields. There are programs of funded research, field service programs, and internship experiences available in cooperation with agencies and schools. The Department sponsors the Center for the Study of Children, Relationships, and Culture and manages the on-campus Center for Young Children. Faculty in the department make use of the research facilities at the Maryland Neuroimaging Center and Maryland Language Science Center. Students in the College of Education have access to the latest technology through Educational Technology Services.

Human Development Education, Certificate of Advanced Study (C.A.S.)

This certificate is not currently accepting applications.

Human Development Education (Z903)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.education.umd.edu

Admissions

Please visit the department website for more information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Human Development Education, Certificate of Advanced Study (C.A.S.) (p. 251)

Industrial/Organizational Psychology (MPIO)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The University of Maryland Master's of Professional Studies in Industrial Organizational Psychology provides rigorous training in the scientific principles and methods in IO Psychology while also increasing graduates' capacity to influence the way work is done, to apply evidence-based best practices, and to ask and answer questions that matter in the workplace. Students take 10 courses (two per term) over the course of 15 months. Courses are taught in the evenings at the College Park campus and through pre-recorded online lectures. This program is designed for working professionals who desire advanced knowledge in industrial and organizational psychology to enter, advance, or expand their career options.

Contact

Paul Hanges
Academic Program Director
3147G Biology-Psychology Building
4094 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5930
Email: phanges@umd.edu

Juliet Aiken,
Program Director
1121 Biology-Psychology Building
4094 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7861
Email: jraiken@umd.edu

Website: http://psyc.umd.edu/graduate/mps-industrial-organizational-psychology

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Admissions interview

The Masters in Industrial Organizational Psychology program offers Fall admissions only. Invitations to interview for the program will be sent to select students by May 1, 2017. UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). Additional Requirements can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/industrialorganizational-psychology/apply#International.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	1 Mar
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	1 Mar

Other Deadlines: Please visit the program website at http://psyc.umd.edu/graduate/mps-industrial-organizational-psychology

Requirements

- Industrial/Organizational Psychology, Master of Professional Studies (M.P.S.) (p. 253)

Facilities and Special Resources

Courses follow a blended format with classes taking place both face to face and online. In person classes are held at the College Park campus in the evenings.

Industrial/Organizational Psychology, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
Required courses:		
PSYC652	Analytical Thinking: Statistical Methods at Work	3
PSYC603	Introduction to Industrial and Organizational Psychology	3
PSYC653	The Business of Evaluation: Research Methods at Work	3
PSYC732	Selection and Classification Issues in Organizations	3
PSYC654	Advanced Analytical Thinking: Statistical Methods at Work II	3
PSYC655	Talent Development	3
PSYC656	Business Fundamentals and Legal Issues facing Organizations	3
PSYC657	Managing Strategic Organizational Change	3
PSYC661	Practicum in IO Psychology	3
PSYC660	Performance Management, Compensation, and Benefits	3
Total Credits		30

Information Assurance Management (Z026)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.oes.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oes.umd.edu

Requirements

- Information Assurance Management, Post-Baccalaureate Certificate (P.B.C.) (p. 253)

Information Assurance Management, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Information Management (INFM)

Graduate Degree Program
College: Information Studies

Abstract

The Master of Information Management (https://ischool.umd.edu/mim) (MIM) program at the College of Information Studies, Maryland's iSchool prepares graduates to be industry leaders in information science and technology, maximizing the value of information management solutions and empowering organizations through the optimized decision-making process. Drawing from management, computer science, information systems, and information science, the MIM program provides students with the skills and knowledge necessary to successfully meet users' information needs, lead efforts to develop organizations' information management capabilities, develop and deploy emerging technologies, and manage high-value information resources.

The specific goals of the MIM program are to:

- Prepare professionals for leadership positions that bridge the gap between technology-oriented staff, functional personnel, and management;
- Address the growing need for skilled information professionals who can strategically manage information and technology assets to fulfill critical information needs in organizations;
- Provide leadership in the information management field through the study of ethical, political, social, and technical issues related to information management in modern society;
- Assist organizations in the formation of information policies, development and application of information systems and services, and the use of information management technologies and methods.

The MIM curriculum consists of 36 credits (12 courses) of graduate-level coursework in information management and related subjects, including a balanced mix of required and elective courses. The courses are integrated into four main blocks:

- Core courses provide a foundation of skills and knowledge related to information, technology, user analysis, and management. They are also opportunities for students to determine which aspects of information management they find most interesting and useful.
- Specialized courses in Management and Information Technology enable students to build advanced skills and knowledge and develop the expertise required in the information management field;
- Practicum courses allow students to connect theory from their learning experience in the classroom to real-world settings through projects carried out in partner organizations;

- Elective courses provide flexibility to the program and allow students to pursue their own educational and professional interests in greater depth.

The Master of Information Management degree courses are offered at the College Park campus (College Park, Maryland), at the Universities at Shady Grove campus (Rockville, Maryland), and online.

Financial Assistance

For more information on merit-based aid, please visit the Financial Aid (http://ischool.umd.edu/tuition-fees) section of the College of Information Studies website (http://ischool.umd.edu).

Contact

For more information about applying to the MIM program (http://ischool.umd.edu/mim-admissions), please contact the iSchool Student Services Office at ischooladmission@umd.edu.

Please visit the College of Information Studies website (http://ischool.umd.edu) for details on upcoming Information Sessions (https://ischool.umd.edu/welcome) or Open House programs.

College of Information Studies
4110 Hornbake Building, South Wing
7130 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2038
Fax: 301.314.9145
Email: ischooladvisors@umd.edu

Website: **http://www.ischool.umd.edu**

Courses: INFM INFM INST

Relationships: Curation and Management of Digital Assets (online) (Z093) (p. 151) **Human-Computer Interaction (HCIM)** (p. 248) Information Management (INFM) (p. 253) Information Studies (INFS) (p. 256) Library and Information Science (LBSC) (p. 276) Library and Information Science (online) (LBSO) (p. 278)

Admissions

General Requirements

- Statement of Purpose: Though the responses to these questions may have some overlap with the Graduate School's statement of purpose – applicants may cut and paste, as relevant, from the Graduate School's statement submission
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT): GRE scores are required for all applicnats, except domestic applicants with an undergraduate GPA of 3.25 or higher. Any requests to waive the GRE requirement will be evaluated on a case-by-case basis by the program committee. GMAT scores may also be submitted instead of GRE scores (please notify the department if you will be sending GMAT scores). Please send any requests to mimprogrammanager@umd.edu.
- CV/Resume
- Supplementary Application

The admissions process for the MIM program is designed to determine whether the program is a good fit for student's background, education, and professional development goals. Applications for admission to MIM program are evaluated on the basis of the following criteria:

- A baccalaureate degree from a regionally accredited college or university with a minimum "B" or 3.0 average on a 4.0 scale on all academic work attempted for consideration;
- Strength of the three (3) recommendations from persons able to judge probable success in graduate school;
- Strength of applicant statement of purpose, explaining the reasons for undertaking the graduate study at the University of Maryland;
- Strength of targeted applicant essay, describing why you are interested in the Masters of Information Management program and why this program is a good fit for your professional/career goals;
- Acceptable scores on the General Test of the Graduate Record Examination (GRE) or the Graduate Management Admission Test (GMAT);
- International applicants are required to submit the TOEFL or IELTS scores;
- Potential for leadership and innovation in information management as reflect in previously earned graduate degrees and work experience;

Please visit the MIM Admission (http://ischool.umd.edu/mim-admissions) page for more information about applying to the MIM program.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Feb

Other Deadlines: Please visit the program website at http://www.ischool.umd.edu

Requirements

- Information Management, Master of Information Management (M.I.M.) (p. 255)

Facilities and Special Resources

The College operates six research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), the Trace Center, and the Digital Curation Innovation Center (DCIC).

iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, and the College of Education.

The College also operates a student computer lab for currently enrolled students.

Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory, and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Information Management, Master of Information Management (M.I.M.)

Thesis option: 36 credits
Non-thesis option: 36 credits

Successful completion of the MIM degree requires that students complete 36 credit hours of academic work with at least a B average (3.0 GPA). Full-time students complete the program in 24 months. Part-time students typically complete the program in two to three academic years. Students may take courses in daytime and evening and may switch between part-time and full-time enrollment. However, all coursework must be finished within five calendar years of the first registration.

All MIM students must complete four core courses, which provide a foundation of skills and knowledge related to information, technology, user analysis, and management. These courses must be completed within student's first 18 credits in the program. The MIM core courses include:

After completing the MIM core courses, all students are required to complete a set of electives that provide depth of knowledge in one or more areas of information management expertise. To help students satisfy this requirement, the MIM program offers a variety of specialization guidelines, which provide students with examples of ways their MIM elective coursework can be organized to meet their educational and professional goals. The program offers two specialization tracks:

- Information Analysis - with a focus on either **Data Analytics** or **Strategic Management.**
- Technology Design - with a focus on either **User Experience** or **Technology Development.**

If students are interested in developing a general course of study, there is an option for the **Individualized Program Plan**. There is also an option for the thesis track, titled **Information Management Research**.

Course	Title	Credits
Required courses:		
INFM600	Information Environments	3
INFM603	Information Technology and Organizational Context	3
INFM605	Users and Use Context	3
INFM612	Management Concepts and Principles for Information Professionals	3
Thesis or Non-Thesis Requirements		
Select one of the following:		6
Thesis:		
INFM799	Master's Thesis Research	
Non-Thesis:		
INFM736	Information Management Experience	
INFM737	Information Management Capstone Experience	
Specialization Options		
Select one of the following:		18
Archives and Digital Curation [1]		
User Experience [1]		
Data Analytics [1]		
Strategic Management [1]		
Technology Development [1]		
Information Management Research [2]		
Individualized Program Plan [1]		
Total Credits		36

1 Non-thesis option only
2 Thesis option only

Information Management (online) (MIMO)

Graduate Degree Program
College: Information Studies

This program is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.ischool.umd.edu

Admissions
General Requirements

- Statement of Purpose: Though the responses to these questions may have some overlap with the Graduate School's statement of purpose – applicants may cut and paste, as relevant, from the Graduate School's statement submission
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT): GRE required for international students but can be waived for domestic students with 3.2 GPA and above.
- CV/Resume
- Supplementary Application

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.ischool.umd.edu

Requirements

- Information Management, Master of Information Management (M.I.M.) (p. 256)

Information Management, Master of Information Management (M.I.M.)

This program is not currently accepting applications.

Information Studies (INFS)

Graduate Degree Program
College: Information Studies

Abstract

The PhD program at Maryland's iSchool offers an interdisciplinary approach to research and teaching provided by faculty at this leading public research university. Small classes and wide-ranging research projects enable students to work closely with faculty mentors to gain experience in identifying knowledge gaps, investigating both theoretical and practical solutions, evaluating results, and creating and disseminating new knowledge. A range of required research courses, two foundational doctoral seminars, and electives chosen by the students and their faculty mentors provide both the structure necessary for individuals to become successful researchers and the flexibility that allows them to pursue the research areas about which they are most passionate.

What Are the Unique Aspects of the Doctoral Program?

Maryland's iSchool is at the center of groundbreaking research in the fast-moving field of information studies. With a multidisciplinary faculty studying such diverse topics as online communities, information systems, information policy, human-computer interaction, and digital cultural heritage, the iSchool cultivates doctoral students from a wide range of backgrounds. The PhD program offered at the iSchool provides students with training in interdisciplinary theory, research, and pedagogy as preparation for original research that connects communities, technologies, and information.

The iSchool's location near Washington, DC, the information capital of the world, offers unparalleled opportunities for students to pursue research and employment opportunities. Our PhD students hold internships at and conduct research in government agencies, top technology and design firms, and the nonprofit sector; and graduate to jobs in academia, industry, and government.

What are the Goals of the Doctoral Program?

Upon successful completion of the doctoral program, graduates have:

- Knowledge of the foundations of the field of information studies.
- Mastery of research methods and design.
- Understanding of the research in a specialized content area.
- Proficiency in synthesizing and applying knowledge from a variety of areas.
- Expertise in conducting research and disseminating new knowledge.

Financial Assistance

Information on the availability of financial assistance is available on the Ph.D. program's website at http://ischool.umd.edu/phd. The College seeks to offer funding to entering doctoral students throughout their study in the doctoral program, contingent on factors such as successful progress through the doctoral program, likelihood of timely completion of the doctoral program, qualifications, and the availability of funding.

Contact

Student Services Office
4110 Hornbake Building, South Wing
4130 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2038
Fax: 301.314.9145
Email: ischooladmission@umd.edu

Dr. Ping Wang
Director of Ph.D. in Information Studies Program
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University of Maryland
College Park, MD 20742
Email: ischooladmission@umd.edu

Website: http://www.ischool.umd.edu

Courses: INFM INST LBSC

Relationships: Curation and Management of Digital Assets (online) (Z093) (p. 151) **History and Library & Information Science (HILS)** (p. 246) **Human-Computer Interaction (HCIM)** (p. 248) **Information Management (INFM)** (p. 253) **Library and Information Science (LBSC)** (p. 276) **Library and Information Science (online) (LBSO)** (p. 278) **School Librarianship (Z114)** (p. 367) **Youth Experience (Z113)** (p. 429)

Admissions
General Requirements

- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationinfs.pdf)

Additional Admissions Requirements

- The **Graduate School application** form including a non-refundable application processing fee
- **One official copy of each transcript** from each academic institution attended sent directly from the institution
- Maryland **in-state tuition form**, if applicable
- **Three recommendations** sent directly by the student's references. It is preferable to request at least one letter from a former professor who is able to give an in-depth evaluation of the strengths and weaknesses of the applicant's academic work.

Please read the PhD Admissions FAQ (http://ischool.umd.edu/files/pdf/admissions/doc/PhDAdmissionFAQ2015-08-18.pdf) **for further information.**

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Best consideration: 14 Dec / Final: 15 Mar
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Best consideration: 14 Dec / Final: 15 Mar

Other Deadlines: Please visit the program website at http://www.ischool.umd.edu

Requirements

- Information Studies, Doctor of Philosophy (Ph.D.) (p. 257)

Facilities and Special Resources

The College operates six research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), the Trace Center, and the Digital Curation Innovation Center (DCIC).

iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, and the College of Education.

Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory (HCIL), and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Information Studies, Doctor of Philosophy (Ph.D.)

Doctoral students must complete a minimum of 27 graduate credit hours at the University of Maryland (or 30 hours if a basic statistics course has not been taken before matriculation).

Course work will be taken in three areas of study:

- Information Studies (6 credit hours)
- Research Methods and Design (12 credit hours)
- Specialized area(s) (9 credit hours)

Milestones within the program include:

- First-year review
- Integrative paper
- Dissertation proposal
- Dissertation

Course	Title	Credits
INST800	The Engaged Intellectual: An Introduction to Research and Academic Work	3
INST810	Individual Research Experience	3
INST888	Doctoral Seminar	6
Select 6 additional credits of Research Methods and Design courses		6
Select nine credits in a specialized area		9
Submit an integrative paper		
Dissertation Research Requirement		
INFS899		12
Total Credits		39

Information Systems (BMIS)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial aid is available to qualified full-time and Executive MBA students in the form of fellowships, graduate assistantships, and scholarships.

Contact

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ms_info@rhsmith.umd.edu

Website: http://www.ischool.umd.edu

Courses BMGT BUAC BUDT BUFN BULM BUMK BUMO BUSI

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/ms-information-systems/admissions

MBA and MS Admissions Office: 301-405-2559
Executive MBA Admissions Office: 301-405-2386
Online MBA Admissions Information: 877-807-8741
PhD Admissions Office: 301-405-2214

Admission criteria for the MS program focusing in information systems are based on: quality of undergraduate and graduate coursework; GMAT or GRE score, 1 letter of recommendation; professional experience; video submission; and written essay of objectives. Prospective applicants may contact the program at (301) 405-2559 for information regarding the MS program.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.ischool.umd.edu

Requirements

- Information Systems, Master of Science (M.S.) (p. 258)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Information Systems, Master of Science (M.S.)

Non-thesis only: 30 credits required

The MS in Information Systems program is ideal for those who understand the value of technology and are interested in gaining the knowledge to manage it. You will learn how information is captured, organized, managed and analyzed, preparing you to lead in the ongoing technology revolution. Get ready to harness the power of information and help move your organization to the next level.

Course	Title	Credits
Required courses:		
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758Y - Database Management Systems)	3
BUSI788	Introduction to Global Business Experience (BUSI788B - Data Models and Decisions)	3
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758Z - Data Networks and Infrastructures)	3
BUSI622	Managing Digital Business Markets	2
BUSI621	Strategic and Transformational IT	2
BUSI785	Project Management in Dynamic Environments	2
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758N - Business Process Analysis for Information Systems)	3
Approved Electives		12
Total Credits		30

Integrated Pest Management (Z089)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Contact

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Email: mshofner@umd.edu

Website: http://oes-entm.umd.edu

Relationships: Applied Entomology (MPAE) (p. 46) **Beekeeping (Z088)** (p. 67) **Integrated Pest Management (Z089)** (p. 259) **Organic and Sustainable Agriculture (Z090)** (p. 322) **Urban Agriculture (Z091)** (p. 421)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (1)
- Strong background in biology

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	26 July
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	26 July

Other Deadlines: Please visit the program website at http://oes-entm.umd.edu/

Requirements

- Integrated Pest Management, Post-Baccalaureate Certificate (P.B.C.) (p. 259)

Integrated Pest Management, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

In this 12-credit certificate, students learn the techniques of Integrated Pest Management (IPM), an effective and environmentally conscientious approach to pest management. Students learn about the life cycles of insects and their interaction with the environment to determine the most effective pest control methods while taking in consideration the effects of treatments to local ecosystems.

Course	Title	Credits
Required courses:		
ENTM710	Insect Biodiversity, Physiology and Ecology	3
ENTM725	IPM Practices	3
ENTM735	Sustainability	3
ENTM747	Pollinator Health	3
Total Credits		12

Intelligence Analysis (Z021)

Graduate Certificate Program
College: Public Policy

ABSTRACT

The objective of the Certificate Program in Intelligence Analysis is to develop proficiency in a uniform set of core conceptual competencies and skills that all those involved in the support of major national security and intelligence agencies should possess, as well as additional tools important to particular forms of intelligence analysis.

At no time in American history has sound intelligence analysis been a more important public policy concern. Today, the collection, analysis, and dissemination of intelligence to support national security decision making is rightly at the forefront of government and supporting organizations' actions.

CONTACT

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Website: http://www.publicpolicy.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Original: 30 June / Extended to: 17 Aug	17 Jan
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	N/A	N/A

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Intelligence Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 260)

Intelligence Analysis, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course requirements are as follows:

Course	Title	Credits
Intelligence Policy and National Security		3
Critical Thinking for Analysts		3
Problems of Global Security		3
Elective		3
Total Credits		12

Intermediate Survey Methodology (Z011)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The Post Baccalaureate (Graduate) Certificate in Survey Methodology is designed for the working professional whose education omitted courses in the field of survey statistics and methodology. Both domestic U.S. and international students are welcome to apply. The program is a short but comprehensive treatment of the field at the intermediate level. Courses cover all of the key areas of survey methodology, from the beginning of the design to the completion of the estimation phase. The program is taught at the graduate level but is significantly less intensive than the onsite M.S. program in survey methodology offered by JPSM.

The program provides advanced training in areas needed to professionally design and execute surveys of households, business establishments, institutions, and other populations. Students will learn the construction of questionnaires that reliably measure desired concepts, use of computer assistance in data collection, how different modes of data collection can be used to improve survey data, cognitive psychological applications to survey measurement, and methods of non-sampling error reduction. Students will also learn how to analyze survey data properly reflecting the complex survey design features.

contact

Website: http://www.jpsm.umd.edu

Courses: SURV

Relationships: Survey Methodology (SURV) (p. 392) **Survey Statistics (Z010)**

Admissions

Applicants must meet the following minimum admission criteria as established by the Graduate School:

- Applicants must have earned a four-year baccalaureate degree from a regionally accredited U.S. institution, or an equivalent degree from a non-U.S. institution.
- Applicants must have earned a 3.0 GPA (on a 4.0 scale) in all prior undergraduate and graduate coursework.
- Applicants must provide an official copy of a transcript for all of their post-secondary work.
- International students must fulfill all requirements relating to international academic credentials, evidence of English proficiency, and financial certification. Since the students will not have to enter the U.S., visas will not be required.

These requirements are found at the Graduate School's Web site (https://www.gradschool.umd.edu).

In addition, the certificate program has the following pre-requisite course requirements:

- Completed at least 6 credit hours in mathematical or applied statistics
- Completed the equivalents to Statistical Methods I & II (SURV615, SURV616) or passage of an entrance examination that tests their knowledge of the topics covered in those courses.
- At least one year of work experience in a position dealing with survey or census design, collection, or analysis.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.jpsm.umd.edu

Requirements

- Intermediate Survey Methodology, Post-Baccalaureate Certificate in Intermediate Survey Methodology (P.B.C.) (p. 261)

Facilities and Special Resources

The certificate will require a total of 18 credits earned by taking six 3-credit courses. Onsite courses will be taught during the regular academic semesters (September – December and January – May) and during the summer sessions. Academic calendars are at the Provost website (https://www.provost.umd.edu/calendar).

Students admitted to the certificate program can take up to two courses a term. The expectation is that students would complete the program in two years or less.

Students enrolled in onsite courses will attend at the College Park campus. Some courses are also broadcast to the Census Bureau in Suitland MD, where students can also attend. The lectures for most courses are also recorded and posted to a JPSM website for later viewing.

In the online courses, students will participate using their own computers, providing flexibility for working professionals. The lectures will be recorded and accompanied by real time, weekly online office hours or discussion sessions.

- Recorded lecture material will be posted online at a pre-specified time each week.
- Students will be required to view the class within a set period (usually one week) and are required to submit regular homework assignments.
- Online discussions hosted by the instructor will be used for answering questions and reviewing material presented in lectures.

Intermediate Survey Methodology, Post-Baccalaureate Certificate in Intermediate Survey Methodology (P.B.C.)

18 credits required

Course	Title	Credits
Required courses:		
SURV400	Fundamentals of Survey and Data Science	3
SURV623	Data Collection Methods in Survey Research	3
SURV625	Applied Sampling	3
SURV630	Questionnaire Design and Evaluation	3
SURV701	Analysis of Complex Sample Data	3
Elective	SURV6xx or higher	3
Total Credits		18

International Education Policy (HIEP)

Graduate Degree Program
College: Education

Abstract

The Higher Education, Student Affairs, and International Education (HESI) program is committed to advancing the positive role education can have in society. Our faculty and students study core facets of the education system; this includes the functioning and impact of colleges and universities, student learning and development in higher education, and the enactment and implementation of K-18 and nonformal education policies in an international context. HESI offerings are characterized by a particular emphasis on social justice, diversity, policy, and system change. Our students and faculty are scholars, practitioners, change agents, and innovative leaders active in universities, as well as in national and international organizations and policy-making bodies. The program is a collaborative community that develops theory, conducts research and translates these into practice, and engages students, educators, and professionals in the advancement of education.

The HESI programs offer three areas of concentration: Higher Education; Student Affairs; and International Education Policy. Please only include one area of concentration on the application. Before applying students should familiarize themselves with each concentration area and choose the one that most closely fits their own particular needs and aspirations. The College of Education website (http://www.education.umd.edu/) offers descriptions of all the concentrations, faculty profiles and contact information, and is an essential resource for all applicants.

Note that, as of 2012, the HESI graduate programs are part of a new department, the Department of Counseling, Higher Education, and Special Education. Previously, Student Affairs was part of the Department of Counseling and Personnel Services and Higher Education and International Education Policy were part of the Department of Education Leadership, Higher Education, and International Education.

The **International Education Policy (IEP)** (http://www.education.umd.edu) program offers M.A. and Ph.D.degrees designed to provide an interdisciplinary understanding of today's educational policy and practice. The focus is on the relation of education to economic, political, and social development in both developing and developed countries at local, national, regional, and global levels. The IEP program gives comprehensive attention to education, considering both formal schooling, from pre-school to higher education, as well as non-formal, adult, and community-based education.

Financial Assistance

The Department has a very limited number of merit-based fellowships and graduate assistantships available to doctoral students. Fellowships

are awarded to doctoral students in March only for the following fall semester. Assistantships are also awarded in the spring for the following fall semester, but occasionally an assistantship may become available at another time of year. A large number of assistantships are also available throughout campus, and many students regularly find assistantships in other departments and offices on campus. Both fellowships and assistantships are awarded on a competitive basis. It is to the student's advantage to apply well before the published application deadlines and to submit a complete application package if they intend to be considered for a fellowship, assistantship, or other form of financial aid. It is a requirement that a student be admitted as a condition of eligibility. International students' applications are not considered complete and are not reviewed by the Department until they have received clearance from the Office of International Student and Scholar Services (ISSS), which can take additional time. If you need information about ISSS clearance visit the ISSS website at www.umd.edu/ies. For more information on financial assistance, see the department website: www.education.umd.edu/chse/admissions/finance.

Contact

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Website: http://www.education.umd.edu/CHSE/admissions/admission_criteria/

Courses: EDCI EDCP EDHI

Relationships: Higher Education (HIED) (p. 236) **Student Affairs (HISA)** (p. 387)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample

Please see the "How to Apply" (https://education.umd.edu/admissions/graduate/phd-higher-education) section for details and deadlines.

Grade Point Average (GPA)

A minimum undergraduate grade point average of 3.0 is required. A minimum graduate grade point average of 3.5 is required for doctoral programs.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	14 Dec

Other Deadlines: Please visit the program website at http://www.education.umd.edu/CHSE/admissions/admission_criteria/

Requirements

- International Education Policy, Doctor of Philosophy (Ph.D.) (p. 263)
- International Education Policy, Master of Arts (M.A.) (p. 262)

Facilities and Special Resources

Faculty and students in the Department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including international agencies and non-governmental organizations, provide exceptional opportunities for internships, field experiences, and research to enhance formal course experiences.

International Education Policy, Master of Arts (M.A.)

Thesis option: 30 credits
Non-Thesis option: 30 credits

The M.A. program in International Education Policy is looking for first-rate students with an interest in professional careers or further study in the field. This degree seeks to form professionals with an understanding of the complex array of issues concerning educational policies and practices in both developing and industrialized countries. It also seeks to form professionals who will join institutions working on projects that range from assistance to educational systems under times of crisis to efforts to improve educational curricula and to the conduct of exchanges of students and academics across countries.

The M.A. program requires a minimum of 30 credits and usually takes one and a half to two years to complete. The program is distinguished by

the development of a unique program of study to suit the needs of each student.

Course	Title	Credits
EDHI672	Modes of Inquiry in Education Research	3
Quantitative or Qualitative Methods course		3
Select two of the following:		6
EDHI605	Comparative Education	
EDHI606	Political Economy of Education in a Global Context	
EDHI607	Culture and Education in a Global Context	
Thesis or Non-Thesis Requirements		
Select one of the following:		18
Thesis:		
EDHI799	Master's Thesis Research	
Select one additional research methods course		
International Education Electives and Disciplinary Professional courses		
Non-Thesis:		
EDHI679	Master's Seminar	
International Education Electives and Disciplinary Professional courses		
Complete a Master's paper		
Total Credits		30

International Education Policy, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 90 credits beyond the Bachelor's degree, including a maximum of 24 credits transferred from a previously earned Master's degree. Students are also required to complete 12 credits of EDHI899, which is included in the total credit requirement.

The Ph.D. requires a minimum of 90 credits beyond the B.A. Twenty-four credits are usually accepted for transfer from a previous M.A. degree and 12 credits are awarded for dissertation research, which means the degree generally requires 54 credits of coursework which can be completed in 2 to 3 years. The program is distinguished by the development of a unique program of study to suit the needs of each student. Initial program plans are flexible and are usually revised throughout a student's graduate work as particular directions and their implications for coursework develop.

Course	Title	Credits
A maximum of 24 credits transferred from a previously earned Master's degree.		24
EDHI605	Comparative Education	3
EDHI606	Political Economy of Education in a Global Context	3
EDHI607	Culture and Education in a Global Context	3
Research Methods courses:		
EDHI672	Modes of Inquiry in Education Research	3
Quantitative Methods course		3
Qualitative Methods course		3
Two courses in Methodological Approaches		6
International Education Electives and Disciplinary Professional courses		30
Dissertation Research Requirements		
EDHI899	Doctoral Dissertation Research	12
Total Credits		90

Interpreting (MPIN)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Master of Professional Studies in Interpreting (MPS in Interpreting) is designed to equip students with the required competencies to compete successfully for work as conference interpreters or community interpreters. Example skills include specialized work in both the consecutive and simultaneous modes in health, legal and political settings, for major corporations, international organizations, government ministries, and international, federal, and state courts requiring simultaneous capability.

The MPS in Interpreting is a two-year, 44 credit program. In the first year, you begin to develop high-level skills in consecutive interpretation (oral rendering after the speaker pauses). In the program's second year, you build on these fundamental skills and may learn simultaneous interpreting, while specializing in conference interpreting, or public service interpreting. Simultaneous interpreting may be selected as an elective in the public service interpreting track.

Contact

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Relationships: Consecutive Interpreting (Z080) (p. 140) **Translation (Z079)** (p. 417) **Translation (MPTR)** (p. 416)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements)): A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.

Program-Specific Requirements

- Letters of Recommendation (3)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105andz106.pdf)
- Proof of residency: A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.
- Admissions tests (contact oes@umd.edu)

For complete Admission Information, please visit: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/interpreting-and-translation-gsit/apply

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 May
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar

Other Deadlines: Please visit the program website at http://www.gsit.umd.edu

Requirements

- Interpreting, Master of Professional Studies (M.P.S.) (p. 264)

Interpreting, Master of Professional Studies (M.P.S.)

44 credits required

Students select either the Conference Interpreting track or the Public Service Interpreting track. In either track, students can focus on two languages or three.

Regardless of track or number of languages, all MPIN students must complete the following courses:

Course	Title	Credits
COMM610	Introduction to Translation and Interpreting Studies	3
COMM683	Intercultural Communication Theory	3
COMM769	Professional Practice Forum in Interpreting: Workplace Processes and Procedures	1
COMM789	Seminar: Special Topics in Intercultural Communication	3
COMM657	Professional Practice Forum in Interpreting: Career Portfolio and Exams	1
COMM759	Professional Practice Forum in Interpreting: Practicum	1
Additional course requirements [1]		32
Total Credits		44

[1] Students should check the department website for the remainder of their course requirements. The remainder of the course requirements vary based on the student's track and number of languages.

Jewish Studies (JWST)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Jewish Studies Program offers both a Masters Degree in Jewish Studies, and a Graduate Certificate in Jewish Studies.

The Masters Program in Jewish Studies is designed to offer students broad, interdisciplinary, graduate-level training in Jewish Studies, as well as in-depth focus on some aspect of the Jewish experience. The curriculum draws on the strengths of the Jewish Studies Program at Maryland, especially Jewish History, Bible, Jewish Literature and Cultural Studies (particularly in the ancient and modern periods), Yiddish, Philosophy, Religious Studies, and Israel Studies. In addition, students take courses in cognate fields outside of Jewish Studies in consultation with their advisors. The extremely strong, and still growing, library collection (rivaled in the mid-Atlantic region only by the Library of Congress), and our proximity to the National Archives, the Library of Congress, the U.S. Holocaust Memorial Museum, and other museums and institutions make the University a prime location for graduate Jewish Studies.

The Post Baccalaureate Certificate in Jewish Studies offers students already enrolled in graduate programs at the University to receive training in Jewish Studies. The program draws on faculty in History, English, Philosophy, Hebrew, and other departments and programs.

Financial Assistance

MA applicants are eligible for University-wide fellowships. In addition, the Jewish Studies program may award up to two fellowships per year to outstanding Masters students.

Limited funds may be available for outstanding certificate students.

For more information, please contact the Prof. Charles Manekin, Director of the Meyerhoff Center and Program for Jewish Studies.

Contact

The Joseph and Rebecca Meyerhoff Program and Center for Jewish Studies
4141 Susquehanna Hall
4200 Lehigh Road
College Park, MD 20742

Telephone: 301.405.4975
Fax: 301.405.8232
Email: jwst-contact@umd.edu

Website: http://www.jewishstudies.umd.edu

Courses: JWST

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations
- Writing Sample

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	31 Jan

Other Deadlines: Please visit the program website at http://www.jewishstudies.umd.edu

Requirements

- Jewish Studies, Master of Arts (M.A.) (p. 265)

Facilities and Special Resources

The University's libraries hold over 3,000,000 volumes and house among the strongest holdings in Judaic Studies in the Mid-Atlantic region. In addition to the outstanding holdings of the Library of Congress, the area also offers the specialized resources of the Dumbarton Oaks, the National Archives, the Smithsonian Institution, the U.S. Holocaust Memorial Museum, and numerous other scholarly, cultural, and political resources. Through the Consortium of Institutions in the Washington D.C. area, University of Maryland graduate students may enroll in courses at other universities for graduate credit.

Jewish Studies, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

As a prerequisite for admission, students must have achieved the proficiency-level corresponding to four semesters of university-level Hebrew, and must achieve the level of six semesters of university-level Hebrew by the time they have completed the program. Courses in Hebrew language will not count toward the 30 credits needed for the degree. Students will be asked to demonstrate their knowledge of modern academic Hebrew by examination, or through a research project making extensive use of Hebrew-language materials.

Course	Title	Credits
JWST600	General Seminar in Jewish Studies	3
Two specialization courses		6
One course in each of the following areas: Jewish History, Jewish Thought or Religion, Jewish Literature		9
Thesis or Non-Thesis Requirements		
Select one of the following:		12
Thesis:		
Two courses in Jewish Studies in the student's specialization, approved by advisor		
JWST799	Masters Thesis Research	
Non-Thesis:		
Four courses in Jewish Studies in the student's specialization, approved by advisor		
Submit a dossier of 2 major research papers to be evaluated by an examining committee		
Total Credits		30

Jewish Studies (Z018)

Graduate Certificate Program
College: Arts and Humanities

abstract

The Meyerhoff Center for Jewish Studies is one of the leading centers for Jewish Studies in the United States, boasting an internationally recognized faculty, an excellent and growing Jewish Studies library collection, and especially rich library, archive, and museum resources in the greater Washington area. If you are considering graduate work in Jewish Studies the following information may be useful to you.

The Jewish Studies Program offers a Graduate Certificate and a Masters Degree in Jewish Studies. In addition, Jewish Studies offers special degrees for teachers. The Hebrew Language Program is designed for prospective or current teachers of Hebrew. Students have the option of receiving a MEd in Education (Curriculum and Instruction), or an MA in Jewish Studies. In addition, students continue to have the ability to earn a MEd in Education Policy and Leadership with a Jewish Studies concentration through the College of Education.

contact

The Joseph and Rebecca Meyerhoff Program and Center for Jewish Studies
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4200 Lehigh Road
College Park, MD 20742
Telephone: 301.405.4975
Fax: 301.405.8232
Email: jwst-contact@umd.edu

Website: http://www.jewishstudies.umd.edu

Admissions

In order to be eligible for the Jewish Studies Certificate Program a student must be accepted into or currently enrolled in a master's or doctoral degree program at the University of Maryland. Please contact the Jewish Studies Department for more information.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department website
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website

Other Deadlines: Please visit the program website at http://www.jewishstudies.umd.edu

Requirements

- Jewish Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 266)

Jewish Studies, Post-Baccalaureate Certificate (P.B.C.)

Total Credits: 12 credits required

Students must take four graduate level courses (12 credits) in Jewish Studies. At least six of the 12 credits must be in a different discipline than the student's home department. All students take JWST600 plus at least two other graduate readings or research courses at the 600-800 level. Only one 400-level course can count toward the certificate. Students must work with an advisor to determine which courses best suit their particular need

Course	Title	Credits
JWST600	General Seminar in Jewish Studies	3
Courses in Jewish Studies		9
Total Credits		12

Journalism (JOMJ)

Graduate Degree Program
College: Journalism

abstract

This Master of Journalism (JOMJ) degree is for students with little or no journalism experience who are looking to become professional journalists or media professionals. If you are an experienced journalist looking for a research-focused master's degree, go to Journalism (JOUR) (p. 268); if you're looking for a Ph.D. program, go to Journalism (JOST) (https://academiccatalog.umd.edu/graduate/programs/journalism/jost). If you're seeking a graduate journalism multimedia certificate, go to Multimedia Journalism (Z071) (p. 305).

The JOMJ degree is a non-thesis program that requires up to 36 credits, beginning in the fall semester. JOMJ students' degree program culminates in a review of their journalism portfolio by a panel of faculty and professionals. Broadcast or multi-platform students may further specialize in investigative, computational/data or sports focuses and may also steer their degree into other types of journalism through course selection.

The University of Maryland's journalism school offers all the resources of a top-ranked public research institution located minutes away from Washington, D.C., Annapolis and Baltimore. Its unmatched access to internships in one of the nation's top media markets and opportunities to learn from the pros working in today's multimedia newsrooms make the Philip Merrill College of Journalism a training ground like no other. Our students are fearless and #MerrillMade.

contact

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Email: sdrada@umd.edu

Website: http://www.merrill.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume
- Portfolio (Multimedia Requirements section) (optional)
- 3 Writing Samples: Writing samples uploaded to the Upload Requirements section of the application – under Writing Sample, Supplementary Application One, and Supplementary Application Two.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Early Decision: 15 Dec / Final: 1 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Early Decision: 15 Dec / Final: 1 Feb

Other Deadlines: Please visit the program website at http://www.merrill.umd.edu

Requirements

- Journalism, Master of Journalism (M.J.) (p. 267)

Facilities and Special Resources

The University of Maryland is located just a few miles from Washington, the media capital of the world. Students and researchers have access to The Washington Post and USA Today, as well as hundreds of Washington bureaus for newspapers, online news sites, and TV and radio news outlets from around the world. The Philip Merrill College of Journalism operates daily news bureaus in Washington, D.C., at the Ronald Reagan Building a few blocks from the White House; in Annapolis, just a block from the Maryland State House; and on campus from two locations -- Knight Hall, our state-of-the-art building with multiple news labs and opportunities for multi-platform experimentation; and UMTV, a cable TV station that reaches more than 600,000 homes in central Maryland. The broadcast program is equipped with state-of-the-art digital editing systems used by students to produce a 30-minute nightly newscast. Opened in 2010, Knight Hall also brings all of the College's affiliated centers under one roof. The college also provides equipment for all specialty media classes -- from broadcast cameras to DSLRs -- so students are not required to bring their own equipment.

Journalism, Master of Journalism (M.J.)

Non-thesis only: 36 credits

The degree is a 36-credit program. The M.J. is a non-thesis degree and is the preferred program of those looking to enter the journalism profession. Students admitted to the M.J. program in multi-platform or broadcast journalism are not required to possess prior training or experience in the field. Students who enter the M.J. program with significant professional newsroom experience can request to opt out of the two required 500-level courses. The program's capstone experience is the Capital News Service, where students serve as full-time reporters in news bureaus in Washington and Annapolis, at the college's TV station, UMTV, and from our state-of-the-art news facilities in Knight Hall. For more information on our programs, visit: http://merrill.umd.edu/academics/masters-programs/

Detailed information on the requirements of our programs can be found in the master's program handbook, available online at the bottom of: http://merrill.umd.edu/academics/masters-programs/

Course	Title	Credits
Required courses:		
JOUR501	Fundamentals of Writing and Editing	3
JOUR504	Introduction to Multimedia Skills	3
JOUR702	Journalism Law and Ethics	3
Intermediate Reporting course		3
Critical Thinking course		3
Journalism Elective		3
Specialization Requirements		
Select one of the following:		18
Multiplatform Journalism		
Broadcast Journalism		
Total Credits		36

Specialization Options

Multiplatform Journalism

Course	Title	Credits
JOUR620	Public Affairs Reporting	3
JOUR625	Advanced Capital News Service Bureau	6
or JOUR655	Advanced Online News Bureau	
JOUR652	Interactive Design and Development	3
JOUR772	Methods in Computer-Assisted Reporting	3
JOUR603	News Videography	3
Total Credits		18

Broadcast Journalism

Course	Title	Credits
JOUR603	News Videography	3
JOUR660	Broadcast News Writing	3
JOUR661	Television Reporting and Production	3
JOUR667	Broadcast News Bureau	6
JOUR620	Public Affairs Reporting	3
or JOUR772	Methods in Computer-Assisted Reporting	
Total Credits		18

Journalism (JOST)

Graduate Degree Program
College: Journalism

abstract

Maryland's elite Ph.D. in Journalism Studies (http://merrill.umd.edu/academics/phd-program) prepares scholars for next-generation research in the key issues confronting journalism in the 21st century.

- The program features small classes and a high level of collaboration with professors (http://merrill.umd.edu/academics/phd-program/ph-d-faculty). Work focuses on the analysis of journalism practice and ethics, media history, gender and media, international media, as well as in emerging technology and the audience.
- With an emphasis on helping journalists translate career experience into research expertise, the program is highly successful (http://merrill.umd.edu/academics/phd-program/ph-d-positions) at placing its doctoral graduates into teaching and research posts in higher education.

If you are seeking a master's degree to provide you with the fundamentals of journalism for a professional career, please see the Journalism (JOMJ) (p. 266) degree. If you are an experienced journalist looking for a research-focused master's degree, go to Journalism (JOUR) (p. 268); If you're seeking a graduate journalism multimedia certificate, go to Multimedia Journalism (Z071) (p. 305).

Contact

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Website: http://www.merrill.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample (academic work; optional)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	1 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	1 Feb

Other Deadlines: Please visit the program website at http://www.merrill.umd.edu

Requirements

- Journalism, Doctor of Philosophy (Ph.D.) (p. 268)

Journalism, Doctor of Philosophy (Ph.D.)

The University of Maryland's Ph.D. in Journalism Studies is designed to prepare students for careers in university teaching, academic and industry research, and media consulting. The first two years of the program consist of coursework in theory, research methods, journalism, and an outside area of interest (such as Communications, Sociology, History, etc.). At the end of coursework, students take comprehensive examinations (in theory, cognate area, methodology, and in their areas of specialization). Students then conduct research and write the dissertation. Most successful candidates enter the program with a master's degree, but a master's degree is not a prerequisite for admission

Course	Title	Credits
Core Requirements		
Select a minimum of nine credits of research design and methods courses [1]		9
Select a minimum of 18 credits in Journalism [2]		18
Select a minimum of nine credits in cognate courses outside of Journalism [3]		9
JOUR808	Doctoral Colloquium	1
JOUR698	Special Problems in Communication	3
Dissertation Research Requirements		
JOUR899	Doctoral Dissertation Research in Journalism and Mass Communication	12
Total Credits		52

1 Including JOUR775, JOUR776

2 Including JOUR601, JOUR610, JOUR800, JOUR801

3 Students should consult the Director of Graduate Studies before choosing these courses

Journalism (JOUR)

Graduate Degree Program
College: Journalism

Abstract

This Master of Arts (JOUR) degree is mainly intended for experienced journalists seeking a research-focused, academic journalism degree with the goal of a future teaching or Ph.D. program. If you are seeking a master's degree to provide you with the fundamentals of journalism for a professional career, please see the Journalism (JOMJ) (p. 266) degree. If you're looking for a Ph.D. program, go to Journalism (JOST) (p. 267). If you're seeking a graduate journalism multimedia certificate, go to Multimedia Journalism (Z071) (p. 305).

The Master of Arts in Journalism is a research-oriented, thesis program of 30 credits. The program is intended for experienced journalists, academics and others who are looking for a more scholarly master's program. The degree offers a great deal of flexibility by tapping into the resources of the University of Maryland, a top-ranked, public, research institution located minutes away from Washington, D.C., Annapolis and Baltimore. The college's unmatched access to internships in one of the nation's top media markets and opportunities to learn from the pros working in today's multimedia newsrooms make the Philip Merrill College of Journalism a training ground like no other. Our students are fearless and #MerrillMade.

Contact

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Website: http://www.merrill.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume
- Portfolio (Multimedia Requirements section) (optional)
- 3 Writing Samples: Writing samples uploaded to the Upload Requirements section of the application – under Writing Sample, Supplementary Application One, and Supplementary Application Two.

Applicants seeking admission to the master's program must hold a bachelor's degree from a accredited institution of higher learning. Undergraduate study of journalism and/or professional experience in journalistic fields are not required. Students must take the Graduate Record Examination (GRE), provide three writing samples and obtain three letters of recommendation.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Early Decision: 15 Dec / Final: 1 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Early Decision: 15 Dec / Final: 1 Feb

Other Deadlines: Please visit the program website at http://www.merrill.umd.edu

Requirements

- Journalism, Master of Arts (M.A.) (p. 269)

Facilities and Special Resources

The University of Maryland is located just a few miles from Washington, the media capital of the world. Students and researchers have access to The Washington Post and USA Today, as well as hundreds of Washington bureaus for newspapers, online news sites, and TV and radio news outlets from around the world. The Philip Merrill College of Journalism operates daily news bureaus in Washington, D.C., at the Ronald Reagan Building a few blocks from the White House; in Annapolis, just a block from the Maryland State House; and on campus from two locations -- Knight Hall, our state-of-the-art building with multiple news labs and opportunities for multi-platform experimentation; and UMTV, a cable TV station that reaches more than 600,000 homes in central Maryland. The broadcast program is equipped with state-of-the-art digital editing systems used by students to produce a 30-minute nightly newscast. Opened in 2010, Knight Hall also brings all of the College's affiliated centers under one roof. The college also provides equipment for all specialty media classes -- from broadcast cameras to DSLRs -- so students are not required to bring their own equipment.

Journalism, Master of Arts (M.A.)

Thesis only: 30 credits

The degree requires 30 credits of coursework and a thesis, which is a critical and scholarly work. Required among the 30 credits are three-credits of research methods, three credits of theory and six credits of master's thesis work. The remaining 18 credits are comprised of elective courses, which may be taken within the College of Journalism or, with approval, in affiliated fields of study within the Graduate School or Washington Consortium.

Course	Title	Credits
Theory course		3
Research Methods course		3
Electives chosen with advisor		18
JOUR799	Master's Thesis Research	6
Total Credits		30

Justice Leadership (MPJL)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The degree is jointly offered by the Department of Criminology and Criminal Justice and the School of Public Policy and is directed by Professor Charles Wellford.

Contact

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Relationships: Criminology and Criminal Justice (CJCH) (p. 147)
Criminology and Criminal Justice (CRIM) (p. 148)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- Notarized degree certificate
- Transcripts in English and Vietnamese

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not currently accepting applications
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not currently accepting applications

Other Deadlines: Please visit the program website at https://oiep.umd.edu/

Requirements

- Justice Leadership, Master of Professional Studies (M.P.S.) (p. 270)

Justice Leadership, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
University of Maryland courses:		
CCJS600	Criminal Justice	3
CCJS601	Policing	3
CCJS604	Policy Analysis Project	3
CCJS680	Drugs and Crime	3
PUAF/PLCY692	Leadership Principles and Practices	3
PUAF/PLCY699	Selected Topics Public Policy	3
PUAF/PLCY711	Public Management and Leadership	3
Vietnam People's Police Academy courses:		
BSOS678	Special Topics in Justice Leadership (BSOS678A)	3
BSOS678	Special Topics in Justice Leadership (BSOS678B)	3
BSOS678	Special Topics in Justice Leadership (BSOS678C)	3
Total Credits		30

Kinesiology (KNES)

Graduate Degree Program
College: Public Health

Abstract

A vital part of the School of Public Health, the Department of Kinesiology offers programs leading to the Master of Arts (thesis and non-thesis options) and Doctor of Philosophy degrees. Research emphases within the three broadly defined areas of exercise physiology, cognitive motor neuroscience, and physical cultural studies are offered. Within each of these cognate areas, students develop specialized programs with faculty guidance and consistent with faculty expertise. Details of faculty research interests and additional information can be found at the department website http://www.sph.umd.edu/KNES/

Financial Assistance

Teaching and research graduate assistantships are offered each academic year. At the present time, over two-thirds of the graduate students are financially supported. Teaching assistants work as discussion leaders and laboratory assistants as well as instructors in physical activity classes. Many research assistants are supported by grants. The department is active in seeking University fellowships for its outstanding applicants. Currently the department provides partial financial support for all graduate students who are selected to present their research at scholarly meetings.

Contact

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Website: http://www.sph.umd.edu/knes

Courses: KNES

Relationships: Bioengineering (BIOE) (p. 74) **Neurosciences and Cognitive Science (NACS)** (p. 316)

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Teaching Assistantship form (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationknes.pdf)

Students may qualify for admission with a 3.0 GPA for M.A. or 3.5 GPA for Ph.D. programs, strong GREs, and a focused letter detailing academic and research goals as well as previous research experiences. In addition, each applicant should submit a minimum of three strong recommendations from people knowledgeable about the applicant's prior academic achievements and research potential. Appropriate background course work closely aligned with the intended research specialization is expected. Graduate faculty sponsorship is also necessary for admission; each faculty member has only a limited number of openings and only the most highly qualified applicants are selected. Faculty review of applications does not occur until all required parts of the application are received. This review is done in early January; therefore applicants are

encouraged to have all their application materials submitted by January 1 for best consideration for admission and financial support.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	1 Feb	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	1 Feb	28 Sep

Other Deadlines: Please visit the program website at http://www.sph.umd.edu/knes

Requirements

- Kinesiology, Doctor of Philosophy (Ph.D.) (p. 272)
- Kinesiology, Master of Arts (M.A.) (p. 271)

Facilities and Special Resources

The Department has three areas of specialization: Cognitive Motor Neuroscience, Exercise Physiology, and Physical Cultural Studies. Laboratories are maintained, which support original investigations in each of the three areas. Laboratories include equipment for measuring metabolic parameters, strength, body composition, postural sway, ground reaction forces, amount of physical activity in daily life, as well as muscle biopsies and movement analysis. The response of the human body to physical activity/exercise can be viewed through ECG, EEG, EMG and systematic behavior observation systems. Each of the three research areas has interfaced computer hardware and software to support data collection and analysis. Collaborations with the School of Medicine at the Baltimore campus and with NIH often result in the availability of other facilities and equipment. All graduate students have access to computers and other forms of technology. Details and pictures of current facilities and equipment are available at our website: www.sph.umd.edu/KNES/.

Cognitive Motor Neuroscience Lab Various tools provide students with opportunities to measure, postural sway, ground reaction forces, multi-digit pressing and moments in 3-D, and movement analysis. These tools include:

1. A three wall rear-projected monoscopic CAVE display system with three XGA digital projectors. The system is designed for standing humans to be immersed in a visual world to test questions about how the nervous system processes visual information to maintain upright stance.
2. A hydraulically-controlled moveable force platform for recording center of pressure and ground reaction forces inside the CAVE.
3. An Optotrak motion analysis system, capable of tracking up to 24 LEDs simultaneously for whole body analysis.
4. A touch plate consisting of a miniature force plate capable of resolving .01 N of force in three directions.
5. A Logitech 6D ultrasonic tracking system consisting of a control unit, two triangular receivers and one triangular transmitter. Each receiver provides three components of translation (x, y, z) and three components of rotation (yaw, pitch, roll) with a resolution of .006 cm.
6. A 16 channel EMG Neuraxon system for recording muscle activity. Because responses of the human body can be viewed through Electrocardiographic (ECG), Electroencephalic (EEG), and Electromyographic (EMG), we collaborate with the University of Maryland, School of Medicine at Baltimore and the National Institutes of Health. This results in the availability of other facilities and equipment whereby students may join forces on projects involving neuroimaging and virtual reality environments.

Exercise Physiology Lab The Exercise Physiology group has various laboratories capable of supporting a wide-range of exercise-related studies, including metabolic testing, Bod-Pod body composition, muscular strength and power testing, and various clinical blood-based assays. Moreover, the group collaborates with various nearby facilities for high-quality measurement of body composition, including muscle size, bone density, and visceral adiposity. A 6,000 sq. ft. training facility is fully equipped with aerobic exercise training equipment and 20+ Keiser strength training machines for all major muscle groups. In addition to these general facilities, the group maintains other specialized laboratories. The Functional Genomics Lab studies the role of genetic variation in disease susceptibility and the responses and adaptations of different individuals to various exercise programs. The lab has state of the art equipment for genetic analysis, including extensive computer resources. The Molecular Biology Lab has extensive scientific resources for examining the effects of exercise and inactivity on muscle, adipose, and other cell types utilizing both in vivo and in vitro approaches. website: www.sph.umd.edu/KNES/.

Physical Cultural Studies (PCS) advances the critically and theoretically-driven analysis of physical culture, in all its myriad forms. These include sport, exercise, health, dance, and movement related practices, which PCS research locates and analyzes within the broader social, political, economic, and technological contexts in which they are situated. More specifically, PCS is dedicated to the contextually based understanding of the corporeal practices, discourses, and subjectivities through which active bodies become organized, represented, and experienced in relation to the operations of social power. PCS thus identifies the role played by physical culture in reproducing, and sometimes challenging, particular class, ethnic, gender, ability, generational, national, racial, and/or sexual norms and differences.

Kinesiology, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Completion of the master's degree with thesis requires a minimum of 24 semester hours and six thesis credits. The M.A. non-thesis option requires a minimum of 27 semester hours, a three-credit project based on an independent scholarly investigation, and a final comprehensive examination. Students in both options work under the direction of a graduate faculty advisor and must complete, as a minimum, six semester hours in a cognate area, six semester hours in research processes, and twelve semester hours in supporting courses either in or outside of the department. If internships are selected as part of the individual program, the total credits will exceed the minimum 30 credits.

Course	Title	Credits
Required courses:		
SPHL600	Foundations of Public Health	3

KNES610	Methods and Techniques of Research	3
SPHL612	Research Ethics	1
Research tools/processes course		3
Elective		5
Specialization Requirements		
Specialization courses		6
Outside Specialization courses		3
Thesis or Non-thesis		
Thesis option:		6
MIEH799	Master's Thesis Research	
Non-thesis option:		
KNES789	Advanced Projects in Kinesiology	
Elective		
Total Credits		30

Kinesiology, Doctor of Philosophy (Ph.D.)

The doctoral program is designed to prepare outstanding scholars in a research domain in Kinesiology. To complete the program, a student must provide substantial evidence of his or her ability to frame and complete original research. The doctoral program in Kinesiology requires a minimum of 60 credits.

The program of study includes research experiences, as well as courses in the cognate area, other supportive courses outside of the department that broaden or deepen one's knowledge, and courses in research and analytic processes. Students also are expected to engage in the culture of Kinesiology through active participation in seminars and other departmental activities and to develop teaching expertise in the subdiscipline. All Ph.D. students are expected to complete a dissertation, which is the culminating research experience and contributes to knowledge in kinesiology.

Course	Title	Credits
Required coursework includes:		
KNES609	Research Issues in Kinesiology	1-3
or KNES618	Current Readings in Exercise and Applied Physiology	
KNES620		3
SPHL612	Research Ethics	1
SPHL600	Foundations of Public Health	3
Research Skills and Methods Course		3
Remainder of coursework		48
Dissertation Research Requirements		
KNES899	Doctoral Dissertation Research	12
Total Credits		71-73

Landscape Architecture and Community Planning (LACP)

Graduate Degree Program
College: Agriculture and Natural Resources / Architecture

Financial Assistance

Please visit the program website at http://www.larch.umd.edu or http://www.arch.umd.edu.

CONTACT

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Website: http://www.larch.umd.edu or http://www.arch.umd.edu

Admissions
General Requirements

- Statement of Purpose: In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- Supplementary Application (https://drupal-base-s3-drupalshareds3-1qwpjwcnqwwsr.s3.amazonaws.com/gradschool/s3fs-public/uploads/admissionsforms/umd_supplementary_application_larc.pdf)
- Portfolio (Multimedia Requirements section of application)
- Must be admitted by both programs to pursue this dual degree.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.larch.umd.edu or http://www.arch.umd.edu

Requirements

- Landscape Architecture and Community Planning, Master of Landscape Architecture and Master of Community Planning (dual degree) (M.L.A. and M.C.P.) (p. 273)

Facilities and Special Resources

Please visit the program website at http://www.larch.umd.edu or http://www.arch.umd.edu.

Landscape Architecture and Community Planning, Master of Landscape Architecture and Master of Community Planning (dual degree) (M.L.A. and M.C.P.)

The dual master's program in Community Planning and Landscape Architecture combines key elements of the Master of Community Planning and the Master in Landscape Architecture. Student have two options for the Landscape Architecture portion of the dual degree. Those who did not major in landscape architecture as undergraduates will be enrolled the First MLA Professional Degree Curriculum. Those students who already have a bachelor's degree in Landscape Architecture will enroll in LARC's Post-Professional degree program.

Two-Year Post-Professional Degree Curriculum: 60 credits

Course	Title	Credits
M.L.A. Requirements:		
Courses in Theory and History		9
Courses in Studio Design and Planning		15
Courses in Independent Study and Research, with Thesis or Creative Design project		6
M.C.P. Requirements:		
Courses in City and Regonal Planning Knowledge and Skills Development		30
Total Credits		60

Three-Year First Professional Degree Curriculum: 91 credits

Course	Title	Credits
M.L.A. Requirements:		
Courses in Theory and History		12
Courses in Studio Design and Planning		25
Courses in Graphic Communication and Practice Technology		15
Courses in Ecology and Plant and Soil Sciences		3
Courses in Independent Study and Research, with Thesis or Creative Design project		6
M.C.P. Requirements:		
Courses in City and Regional Planning Knowledge and Skills Development		30
Total Credits		91

Landscape Architecture (LARC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Master of Landscape Architecture (MLA) is a professional degree program that prepares students for work as academicians and practitioners. The three-year first professional degree curriculum is for students who have a bachelor's degree in a non-design field. The MLA is a degree that is accredited by the LAAB (Landscape Architecture Accreditation Board), which allows graduates to sit for the professional license exam (LARE). The two-year post-professional degree curriculum is for students who have a bachelor's degree in landscape architecture or a related design field. Through the required courses, concentration electives, and individual research, each student will acquire a thorough theoretical basis, grounding in methods and practices, and exposure to contemporary local and global issues. The required studio courses and the thesis or creative project, conducted with faculty and community partners, advances the knowledge base of landscape architecture through research and community outreach activities.

Our extensive hands-on training and real-world creative problem-solving approaches provide you the knowledge, skills, and abilities needed to excel and make a difference. The studio experience provides an opportunity to implement ecological design solutions ranging from development, conservation, and restoration. From creating livable communities to solving environmental design problems, Landscape Architects are committed to helping shape the future while protecting the past.

The MLA program is interdisciplinary in its philosophy and its operation. Individual courses convey concepts and tools from diverse disciplines and studio, research, and outreach projects have a multi-discipline association. Project and research advisors come from faculty in Landscape Architecture, Plant Science, Environmental Science, Geography, Geology, American Studies, Architecture, Urban Studies and Planning, Historic Preservation, Real Estate Development, and other academic disciplines and professional partnerships.

Financial Assistance

A limited number of Graduate Assistantships are available to qualified students. These include Teaching, Research, and Administration Assistantships. Assistantships can be 9-month or 12-month appointments and include tuition remission (5 to 10 credits each semester, commensurate with GA appointment), an annual salary, health benefits, and in-state tuition, in exchange for 10 to 20 hours of work per week. Scholarships, fellowships, and other funding sources are available through a variety of external agents, such as the Landscape Architecture Foundation (LAF), the Garden Club of America (GCA), and others, including the following:

- Steven G. King Play Environments Scholarship: undergraduate or graduate students enrolled at LAAB-accredited schools. Award: $5,000.
- The Dangermond Fellowship: graduate students in the United States. Award: Up to three (3) $10,000 fellowships.
- Peridian International, Inc./Rae L. Price, FASLA Scholarship. Award: $5,000.

- The Douglas Dockery Thomas Fellowship in Garden History and Design: graduate student in the United States. Award: $4,000.

Contact

Sharde Davenport
Executive Administrative Assistant
2104 Plant Sciences Building
4291 Fieldhouse Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6244
Fax: 301.314.9308
Email: sdav@umd.edu

Christopher D. Ellis, Ph.D., PLA, ASLA
Associate Professor, Director of Landscape Architecture Programs
Department of Plant Science and Landscape Architecture
2144 Plant Science Building
4291 Fieldhouse Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4350
Fax: 301.314.9308
Email: cdellis@umd.edu

Website: http://larch.umd.edu

Courses: LARC

Relationships: Architecture (ARCH) (p. 50) **Community Planning (CMPL)** (p. 130) **Historic Preservation (HISP)** (p. 238) **Landscape Architecture and Community Planning (LACP)** (p. 272) **Plant Science (PLSC)** (p. 328)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://drupal-base-s3-drupalshareds3-1qwpjwcnqwwsr.s3.amazonaws.com/gradschool/s3fs-public/uploads/admissionsforms/umd_supplementary_application_larc.pdf)
- Portfolio (Multimedia Requirements section of application)

Portfolio

The portfolio is a compilation of graphic, written or scored work that you have created or observed and recorded. This collection should show your interest and aptitude for the visual language of design. Expertise in design is welcomed but not required. The portfolio should illustrate your interests in a variety of areas related to landscape architecture and environmental design. This portfolio should be uploaded digitally with your application. If you have any questions please email Sharde Davenport at sdav@umd.edu. **Portfolios are due no later than the application deadline. PLEASE NOTE: Transcripts and financial information should be sent to: University of Maryland ESO-Graduate Rm 0130 Mitchell Building College Park, MD 20742.**

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred: 1 Feb / Final: 27 July	18 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Preferred: 1 Feb / Final: 15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://larch.umd.edu

Requirements

- Landscape Architecture, Master of Landscape Architecture (M.L.A.) (p. 275)

Facilities and Special Resources

The Master of Landscape Architecture program is accredited by the Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects. The program maintains a balance between design theory and application in a professional degree curriculum. The MLA program builds upon the strengths of the Department of Plant Science and Landscape Architecture (PSLA) and the Landscape Architecture Program (LARC). The PSLA Department is composed of faculty members who specialize in landscape architecture, landscape history, ecology, plant science, urban forestry, turf and golf course management, and landscape management. It provides a strong, comprehensive grounding for landscape design, planning and preservation, landscape assessment, site and ecological systems analysis, plant identification, plant conservation, and plant pathology. Other environmental programs in the College of Agriculture and Natural Resources offer knowledge and practical insight into the science of ecology, ecological restoration, water and soil conservation, and forest management. The MLA builds on this collaboration through advanced courses, student advising, and the contribution of non-teaching programs such as lectures, symposia and research projects.

The Master of Landscape Architecture Program is located in the Plant Sciences Building on the College Park campus. Advanced individual computing facilities, personal drafting stations, scanning and printing facilities, and a model-making workshop are available 24 hours a day, 7 days a week, to every student in the MLA program.

Landscape Architecture, Master of Landscape Architecture (M.L.A.)

Three-Year First Professional Degree Curriculum

(70 Credits + 6 credits @ 200-level, if required)

Students will be advised to take remedial Woody Plant Identification courses prior to arrival or in the first year of study at Maryland. The MLA Program requires these courses in order to meet accreditation standards. Requirements (contact department for detailed curriculum):

Course	Title	Credits
Courses in Theory and History		12
Courses in Studio Design and Planning		25
Courses in Graphic Communication and Practice Technology		15
Courses in Ecology and Plant and Soil Sciences (plus 6 credits of remedial courses)		3
Courses in Independent Study and Research, with Thesis or Creative Design project		15
Total Credits		70

Two-Year Post-Professional Degree Curriculum

This curriculum is for those students with a Bachelor of Landscape Architecture or other approved environmental design degree. Requirements (please contact department for detailed curriculum):

Course	Title	Credits
Courses in Theory and History		9
Courses in Studio Design and Planning		15
Courses in Independent Study and Research, with Thesis or Creative Design project		15
Total Credits		39

Leadership Education & Development (MPLD)

Graduate Degree Program
College: Education

This program is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.education.umd.edu

Admissions

This program is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Leadership Education & Development, Master of Professional Studies (M.P.S.) (p. 275)

Leadership Education & Development, Master of Professional Studies (M.P.S.)

This program is not currently accepting applications.

Leading and Managing Healthcare Transformation (Z124)

Graduate Certificate Program
College: Business

abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall

7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Fax: 301.314.9862
Email: ms_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at **www.rhsmith.umd.edu**. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/ms-accounting/admissions

MBA and MS Admissions Office: 301.405.2559
Executive MBA Admissions Office: 301.405.2386
Online MBA Admissions Information: 877.807.8741
PhD Admissions Office: 301.405.2214

Admission criteria for the MS program focusing in accounting are based on: quality of undergraduate and graduate coursework; 1 letter of recommendation; professional experience; video submission; and written essay of objectives. Prospective applicants may contact the program at 301.405.2559 for information regarding the MS program.
Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Leading and Managing Healthcare Transformation, Post-Baccalaureate Certificate (P.B.C.) (p. 276)

Leading and Managing Healthcare Transformation, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
BUSI790	Healthcare Operations Management and Marketing	3
BUSI792	Health Informatics and Information Technologies	3
BUSI794	Current Topics in Healthcare Transformation	3
BUSI796	Health Economics and Financing	3
Total Credits		12

Library and Information Science (LBSC)

Graduate Degree Program
College: Information Studies

Abstract

The fully American Library Association (ALA) accredited Master of Library and Information Science (MLIS) program at the University of Maryland prepares graduates to be socially engaged and technologically focused information professionals, ready to create, educate, and innovate. The MLIS is a professional degree that provides students with a comprehensive foundation in both research and practice in library and information science. This foundation prepares students for careers with government agencies, archives, museums, libraries, startups, and any organization engaged in information activities.

At the iSchool we seek students who will serve as the next generation of leaders in information science and who will succeed in the dynamic and evolving global information society.

The MLIS program is designed for students from a wide variety of academic and career backgrounds, and is flexible enough to accommodate students working full or part-time. Students can complete their MLIS degree in-person, fully online, or through a hybrid approach.

Each student in the MLIS Program selects one of our unique specializations. Our specialization offerings are:

- Archives and Digital Curation
- Individualized Program Plan
- Diversity and Inclusion
- School Library
- Youth Experience
- Intelligence Analytics
- Legal Informatics

To request information about the MLIS program, please reach out to us at https://umdgrad.askadmissions.net/emtinterestpage.aspx?ip=umdinformationstudies or at mlisprogram@umd.edu.

Financial Assistance

For more information on financial aid, please visit the Financial Aid (http://ischool.umd.edu/tuition-fees) section of the College of Information Studies (http://ischool.umd.edu) website.

Contact

Student Services Office
College of Information Studies
4110 Hornbake Building, South Wing
4130 Campus Drive
University of Maryland
College Park, MD 20742

Telephone: 301.405.4915
Fax: 301.314.9145
Email: ischooladvisors@umd.edu

Website: http://www.ischool.umd.edu

Courses: INFM INST LBSC

Relationships: Curation and Management of Digital Assets (online) (Z093) (p. 151) **History and Library & Information Science (HILS)** (p. 246) **Human-Computer Interaction (HCIM)** (p. 248) **Information Management (INFM)** (p. 253) **Information Studies (INFS)** (p. 256) **Library and Information Science (online) (LBSO)** (p. 256)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Supplementary Application Essay (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationlbscandlbso.pdf)
- Letters of Recommendation (3)
- CV/Resume

Admission decisions are based upon a thorough review of the applicant's academic record, 3 letters of recommendation, resume/CV, a statement of purpose and a 500 word application essay. Other factors, such as other graduate degrees and work experience, may be considered.

Please visit the Admissions page for complete information: http://ischool.umd.edu/mlis-admissions

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Feb	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Feb	28 Sep

Other Deadlines: Please visit the program website at http://www.ischool.umd.edu

Requirements

- Library and Information Science, Master of Library and Information Science (M.L.I.S.) (p. 277)

Facilities and Special Resources

The College operates six research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), the Trace Center, and the Digital Curation Innovation Center (DCIC). iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, and the College of Education.

Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory, and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Library and Information Science, Master of Library and Information Science (M.L.I.S.)

Thesis option: 36 credits
Non-thesis option (Field Study): 36 credits

The MLIS degree requires 36 credit hours of academic work to be completed with a B minimum average within five calendar years from the first semester of registration. A full-time MLIS student usually completes the program in two years. The time limit for completion of all degree requirements is five years.

Students completing their MLIS courses in-person may take courses in the daytime and evening and may change from part-time to full-time and vice versa, as their circumstances permit. Most in-person MLIS courses are offered during the evening, but there are online sections offered on a rotating basis.

The History/Library Science (HILS) dual degree program requires 54 credit hours for the MLIS and MA in History. The time limit for completion of all degree requirements for this dual degree program is five years.

At least 24 credits of the 36 required credits must be courses taken in the College (LBSC, INST, or INFM). A student may take courses in other UMCP departments or through the Consortium at other area institutions (limit of six credits). Six credits may be transferred from another accredited graduate program. Up to 9 credits earned as an Advanced Special Student at UMCP may be applied to the degree. Information about policies and procedures governing degree requirements and courses taken outside the College is available from the College's Student Services Office and on the College's website at http://ischool.umd.edu/graduate-student-services.

Course	Title	Credits
Core Requirements:		
LBSC602	Serving Information Needs	3
LBSC631	Achieving Organizational Excellence	3
LBSC671	Creating Information Infrastructures	3

LBSC791	Designing Principled Inquiry	3
Thesis or Non-Thesis Requirements:		
Select one of the following:		9
Thesis:		
INST701	Introduction to Research Methods	
LBSC799	Master's Thesis Research	
Non-thesis:		
LBSC703	Field Study in Archives and Digital Curation	
or LBSC707	Field Study in Information Service	
Electives		
Specialization Requirements:		
Select one of the following:		15
Archives and Digital Curation		
Diversity and Inclusion		
Youth Experience		
Legal Informatics		
Intelligence and Analytics		
Individualized Program Plan		
School Library		
Total Credits		36

Library and Information Science (online) (LBSO)

Graduate Degree Program
College: Information Studies

Abstract

The fully American Library Association (ALA) accredited Master of Library and Information Science (MLIS) program at the University of Maryland prepares graduates to be socially engaged and technologically focused information professionals, ready to create, educate, and innovate.The MLIS is a professional degree that provides students with a comprehensive foundation in both research and practice in library and information science. This foundation prepares students for careers with government agencies, archives, museums, libraries, startups, and any organization engaged in information activities.

At the iSchool we seek students who will serve as the next generation of leaders in information science and who will succeed in the dynamic and evolving global information society.

The MLIS program is designed for students from a wide variety of academic and career backgrounds, and is flexible enough to accommodate students working full or part-time.

Each student in the MLIS Program selects one of our unique specializations. Students who pursue the "Individualized Program Plan" may create their own course plan. Online specialization offerings include:

- Individualized Program Plan
- School Library
- Youth Experience
- Diversity and Inclusion

If you would like more information about the MLIS program online, please contact us at ischooladvisors@umd.edu.

Financial Assistance

For more information on financial aid, please visit the Financial Aid (http://ischool.umd.edu/tuition-fees) section of the College of Information Studies (http://ischool.umd.edu) website

Contact

Student Services Office, College of Information Studies
4110 Hornbake Building, South Wing
4130 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4915
Fax: 301.314.9145
Email: ischooladvisors@umd.edu

Website: http://www.ischool.umd.edu

Courses: INFM INST LBSC

Relationships: Curation and Management of Digital Assets (online) (Z093) (p. 151) **History and Library & Information Science (HILS)** (p. 246) **Human-Computer Interaction (HCIM)** (p. 248) **Information Management (INFM)** (p. 253) **Information Studies (INFS)** (p. 256) **Library and Information Science (LBSC)** (p. 276)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Supplementary Application Essay (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationlbscandlbso.pdf)
- Letters of Recommendation (3)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Please visit the Admissions page for complete information: http://ischool.umd.edu/mlis-admissions

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Feb	28 Sep
International Applicants		

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Feb	28 Sep

Other Deadlines: Please visit the program website at http://www.ischool.umd.edu

Requirements

- Library and Information Science, Master of Library and Information Science (M.L.I.S.) (p. 279)

Facilities and Special Resources

The College operates six research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), the Trace Center, and the Digital Curation Innovation Center (DCIC). iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, and the College of Education.

Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory, and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Library and Information Science, Master of Library and Information Science (M.L.I.S.)

Thesis option: 36 credits
Non-thesis option (Field Study): 36 credits

The MLIS degree requires 36 credit hours of academic work to be completed with a B minimum average within five calendar years from the first semester of registration. A full-time MLIS student usually completes the program in two years. The time limit for completion of all degree requirements is five years.

Students completing their MLIS courses in-person may take courses in the daytime and evening and may change from part-time to full-time and vice versa, as their circumstances permit. Most in-person MLIS courses are offered during the evening, but there are online sections offered on a rotating basis.

The History/Library Science (HILS) dual degree program requires 54 credit hours for the MLIS and MA in History. The time limit for completion of all degree requirements for this dual degree program is five years.

At least 24 credits of the 36 required credits must be courses taken in the College (LBSC, INST, or INFM). A student may take courses in other UMCP departments or through the Consortium at other area institutions (limit of six credits). Six credits may be transferred from another accredited graduate program. Up to 9 credits earned as an Advanced Special Student at UMCP may be applied to the degree. Information about policies and procedures governing degree requirements and courses taken outside the College is available from the College's Student Services Office and on the College's website at http://ischool.umd.edu/graduate-student-services.

Course	Title	Credits
Core Requirements:		
LBSC602	Serving Information Needs	3
LBSC631	Achieving Organizational Excellence	3
LBSC671	Creating Information Infrastructures	3
LBSC791	Designing Principled Inquiry	3
Thesis or Non-Thesis Requirements:		
Select one of the following:		9
Thesis:		
INST701	Introduction to Research Methods	
LBSC799	Master's Thesis Research	
Non-thesis:		
LBSC703	Field Study in Archives and Digital Curation	
or LBSC707	Field Study in Information Service	
Electives		
Specialization Requirements:		
Select one of the following:		15
Archives and Digital Curation		
Diversity and Inclusion		
Youth Experience		
Legal Informatics		
Intelligence and Analytics		
Individualized Program Plan		
School Library		
Total Credits		36

Linguistics (LING)

Graduate Degree Program
College: Arts and Humanities

Abstract

Research on language has proven to be one of the most fruitful means to cast light on the nature of the human mind and general cognitive capacity and has taken on a new momentum in the last 30 years. The Maryland Linguistics (http://ling.umd.edu/) program builds on these recent developments and trains students thoroughly in a research enterprise which tries to develop a detailed answer to these questions: How is a person's linguistic capacity represented in the mind, how does that representation reflect properties which are encoded genetically, how is language acquired by young children, how can language be encoded as a computational, psychological or neurological system, and how can linguistic knowledge be used to improve human language technology?

The Department of Linguistics (http://ling.umd.edu/) at the University of Maryland has an internationally recognized Ph.D. program. The Department combines current theoretical research in phonology, morphology, syntax, semantics with state-of-the-art experimental research in psycholinguistics, first language acquisition, language processing, neurolinguistics, and computational linguistics. An interdisciplinary background enables students to evaluate proposals

critically and make a lasting contribution to the field. Many students choose to split their major and minor areas between theoretical and experimental linguistics. Many students also choose to concurrently pursue the Certificate Program in Neuroscience and Cognitive Science (https://nacs.umd.edu/students/landingtopic/nacs-certificate). The department also hosts an NSF-supported interdisciplinary training program on "Biological and Computational Foundations of Language Diversity" (see website for more information).

The Department encourages applications from students with an interest in the Department's areas of expertise. Students with a primary interest in Neurolinguistics and Cognitive Science may also want to consider applying to the Neuroscience and Cognitive Science (https://nacs.umd.edu) (NACS) Ph.D. program. See the Cognitive Neuroscience of Language Laboratory (http://ling.umd.edu/psycholinguistics) for more details on alternative programs of study for psycholinguistics. Students seeking a Ph.D. in other areas of linguistics may want to consider a range of other strong programs at the University of Maryland. The PhD program in Second Language Acquisition (http://sllc.umd.edu/sla), based in the School of Languages, Literatures and Cultures, has a strong cognitive science and research focus. Students with a focus on TESOL should consider the Curriculum and Instruction Program (https://education.umd.edu), based in the College of Education. Students with a clinical focus should also consider the Hearing and Speech Sciences Program (https://hesp.umd.edu). Students interested in human language technology should also consider the PhD programs in the iSchool (http://www.ischool.umd.edu) or the Department of Computer Science (p. 138).

Computational Linguistics

The department also runs two computational linguistics laboratories housing state-of-the-art facilities funded by the NSF and DARPA. The Computational Linguistics and Information Processing (https://wiki.umiacs.umd.edu/clip/index.php/Main_Page) (CLIP) laboratories contain state of the art computing facilities and data resources.

Financial Assistance

Initial offers of admission and financial aid are normally made in February-April. Further offers are sometimes made at a later date, if additional funds become available. In recent years, around 6-8 new students have started the Ph.D. program each year.

Financial aid (tuition + stipend) is available on a competitive basis. The department aims to provide graduate students with financial aid (stipend + tuition) during their full course of study (5 years), provided that the student makes satisfactory academic progress. Graduate funding comes from a number of sources. The Department offers Graduate Assistantships (GAs) and Research Assistantships (RAs). GAs typically involve teaching service in undergraduate linguistics courses. RA positions typically involve research associated with a grant-supported faculty research project. Also available are Graduate Fellowships. The University offers a number of these to outstanding applicants, which release the student from GA or RA responsibilities for 1-2 years of study. Other sources of funding are occasionally available through the Department or University. Also, a number of students come to the Department with funding of their own from external fellowships.

Fellowships and GAs provide 12 and 10 credits of tuition remission respectively per semester. In additions to tuition remission, the Graduate Assistantship comes with Health benefits. The student is responsible for approximately $440.00 in mandatory student fees per semester.

The Department sets aside a portion of its operating budget to support travel by faculty and graduate students to present papers at conferences. Any member of the Department can request support for this purpose. Graduate students may also apply for university travel awards for this purpose.

Contact

The Department's website, Maryland Linguistics (http://ling.umd.edu/), contains a good deal of information on the program, but if you have further questions about Graduate Study in the Department, you should contact Dr. Jeffrey Lidz (jlidz@umd.edu). Alternatively, if you have a particular interest in the research of an individual faculty member, you may want to contact that person directly via email.

Jeffrey Lidz, Ph.D.
Department of Linguistics
1401 Marie Mount Hall
7814 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7002
Fax: 301.405.7104
Email: jlidz@umd.edu

Website: http://www.ling.umd.edu

Courses: LING

Relationships: Hearing and Speech Sciences (HESP) (p. 235) **Neurosciences and Cognitive Science (NACS)** (p. 316) **Second Language Acquisition (SLPH)** (p. 373)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationling.pdf)
- Writing Sample: Up to 3 sample submissions, uploaded to the Upload Requirements section of the application.

All students must hold a Bachelors or Masters degree (or international equivalent) prior to starting the Ph.D. program. Although the student's previous degrees may be in a field other than linguistics, it is essential that a student have some previous experience in linguistics.

Applicants should check the University's admission requirements (https://gradschool.umd.edu/admissions) and the department's web site (http://ling.umd.edu//graduate) for the most up-to-date information on graduate applications. Electronic submission of application materials is strongly preferred. Applicants are encouraged to submit the initial on-line application form well before the application deadline, preferably by mid-

December, since this form must be processed before an applicant is able to submit other electronic materials. Note that the January 5th target date applies to all applicants, domestic and international.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.ling.umd.edu

Requirements

- Linguistics, Doctor of Philosophy (Ph.D.) (p. 281)
- Linguistics, Master of Arts (M.A.) (p. 281)

Facilities and Special Resources

In addition to university and departmental library facilities, linguists at Maryland have ample office and meeting spaces. The department has outstanding resources for interdisciplinary research that bridges theoretical, experimental, and computational linguistics. The Cognitive Neuroscience of Language (http://ling.umd.edu/psycholinguistics) (CNL) Laboratory has the specific purpose of bridging the gap between theoretical/computational models of human language and the brain-level mechanisms that support language. The research in the CNL Lab combines the study of linguistics, cognitive neuroscience, language acquisition and psycholinguistics, genetic disorders and computational modeling. The CNL Lab is housed in around 5000 sf. of labs and offices and includes the following:

1. Event-Related Potentials (ERP) Lab: 128-channel Neuroscan ERP facility for recording electrical signals originating in the brain by measuring electrical activity at the scalp.
2. Magnetoencephalography (MEG) Lab: a 160-channel whole-head MEG facility that is used for non-invasive measurements of the magnetic fields associated with neuronal activity in the brain.
3. Head-mounted Eye Tracking Lab: lightweight eye-tracker suitable for use with children and adults.
4. Fixed Eye Tracking Lab: eye-tracker suitable for on-line studies of reading.
5. Center for Young Children: state-of-the-art on-campus preschool for 3-6 year olds, with testing rooms suitable for study of language acquisition.
6. Infant Language Lab: for testing infants and young children.
7. Phonetic/Speech Analysis facilities: equipment for generation, recording, manipulation and analysis of speech sounds.

In addition to the facilities available at the CNL Lab itself, Maryland linguists have taken advantage of the many additional research opportunities in closely affiliated departments and institutions, in particular at the National Institutes of Health (NIH), located in nearby Bethesda, Maryland. These include fMRI brain imaging, PET brain imaging and TMS (transcranial magnetic stimulation) at NIH, and aphasia research in collaboration with NIH researchers.

Linguistics, Master of Arts (M.A.)

Under exceptional circumstances, students are awarded an MA degree on completion of the core coursework requirements (six courses, see PhD requirements), four further classes, and writing either an MA thesis which is defended publicly (LING799) or two comprehensive papers in different areas of language study (LING798). Two of the post core-level class requirements should be taken in the Department of Linguistics, with the rest being taken either in Linguistics or in other departments satisfying a secondary area of specialization and complementing the student's work. **Note that the Department of Linguistics does not normally admit students whose objective is a terminal M.A. degree.** The M.A. degree primarily serves students who withdraw from the Ph.D. program.

Linguistics, Doctor of Philosophy (Ph.D.)

Students pursuing the Ph.D. take at least 33 graduate-level credits of course-work, of which at least 9 credits are at the 800-level (seminars) and 6 credits correspond to the Minor area of specialization, possibly in another department. These minimum requirements are usually fulfilled by formal classes and not by independent studies, although the latter may be used to supplement a student's program of study. The student's first year is normally devoted to the 'core', foundational coursework in the department's three primary research areas:

1. theoretical linguistics (syntax, semantics, phonology),
2. psycholinguistics/neurolinguistics/language acquisition,
3. computational linguistics.

In addition to satisfying (part of) the 9 credit requirement for seminars, the next two years are devoted to satisfying 6 credits (beyond any core courses) in the Minor, as approved by the Graduate Director. Some students choose to pursue the Certificate in Neuroscience and Cognitive Science, which may count as the minor area.

By their fifth semester, students write a substantial paper (LING895), under the supervision of a faculty member. This paper enables students to demonstrate a capacity for productive research and to make an original contribution to the literature, often forming the basis for the dissertation research. It is submitted to a three member examining committee, is defended publicly two weeks later, and must be approved by the committee after the defense. The student must then upload the completed 895 paper to the 895 folder in the department PDF locker, and inform the Graduate Director that this has been done.

In addition, by their seventh semester students must also write a paper in their Minor area of specialization (or some other area that is not their major area). The paper must be prepared under the supervision of a member of the faculty. Once the paper is completed to the satisfaction of the supervising faculty member, it must be uploaded to the 896 folder in the department PDF locker, and the Minor Area Paper approval form presented to the Graduate Director. [Under special circumstances, upon the written recommendation of the student's advisor and with the approval of the faculty of the department, a student may satisfy the Minor area paper requirement by instead taking a third course in the Minor area.]

LING895 and the Minor area paper replace the 'comprehensive examinations' held in some departments.

To help ensure satisfactory progress towards the degree, students are required to submit to the Graduate Director a Ph.D. Roadmap once each semester, completed in consultation with their advisor.

After satisfactory completion of the 895 paper, students are admitted to candidacy and write a proposal for a dissertation, which a faculty member agrees to supervise. Students enroll in LING899 while working on the dissertation, and must take at least 12 credits of this course. The dissertation must make a substantial and original contribution to knowledge. The supervisor, in consultation with other committee members (selected by the student and the supervisor), determines when there is a draft which will be defended publicly at an oral examination. The dissertation is approved by a five member examining committee. On completion of the approved dissertation, a hard copy will be submitted to the department, along with a 2nd hard copy or else an electronic version for the department web page.

Doctoral students are required to complete 39 credits of coursework, in addition to 12 credits of LING899.

Course	Title	Credits
Required coursework:		
LING800-level electives		9
Minor area courses		6
LING895		6
Select one of the following sequences:		6
Syntax:		
LING610 & LING611	Syntactic Theory and Issues in Syntax	
Phonology:		
LING620 & LING621	Phonological Theory and Issues in Phonology	
Semantics:		
LING660 & LING661	Introduction to Semantics and Issues in Semantics	
Select one additional sequence from the following:		6
Psycholinguistics:		
LING640 & LING641	Psycholinguistics and Issues in Psycholinguistics	
Computational Linguistics:		
LING723 & LING773	Computational Linguistics I and Computational Linguistics II	
Select two additional courses from any unselected sequence		6
Dissertation Research Requirements		
LING899	Doctoral Dissertation Research	12
Total Credits		51

Literacy Coaching (Z038)

Graduate Certificate Program
College: Education

Abstract

The Department of Curriculum and Instruction's (EDCI) literacy coach post-baccalaureate graduate certificate program is designed to prepare experienced, highly qualified middle and high school teachers to serve as literacy coaches in low performing middle and high schools. Literacy coaches are skilled content area collaborators who function effectively in middle school and/or high school settings for secondary teachers in the core content areas of English language arts, mathematics, science, and social studies. They are skilled evaluators of literacy needs within various subject areas and are able to collaborate with secondary school leadership teams and teachers to interpret and use literacy assessment data to inform instruction. Finally, literacy coaches are accomplished middle and high school teachers who are skilled in developing and implementing instructional strategies to improve academic literacy in the four targeted content areas. The program courses focus on

1. reading, cognition, and instruction across content areas,
2. diagnostic reading assessment and instruction,
3. teaching ESOL reading and writing in secondary content areas,
4. assessing, diagnosing, and teaching writing across content areas,
5. TESOL, special education, and assistive technology, and
6. coaching and mentoring teachers.

In addition, literacy coach candidates participate in school district professional development workshops mapped onto the literacy coach coursework. The EDCI literacy coach program addresses the Standards for Middle and High School Literacy Coaches (International Reading Association, 2006). Upon successful completion of the literacy coach program, candidates receive a graduate literacy coach certificate from the University of Maryland.

Contact

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Wayne Slater, PhD
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2311 Benjamin Building
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University of Maryland
College Park MD, 20742
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Fax: 301.314.9055
Email: wslater@umd.edu

Website: http://www.education.umd.edu

Courses: EDCI

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)

Applicants should be highly qualified middle or high school teachers.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	5 Mar	4 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Literacy Coaching, Post-Baccalaureate Certificate (P.B.C.) (p. 283)

Literacy Coaching, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

The Post-Baccalaureate Certificate in Literacy Coaching is a six week program designed to prepare experienced, highly qualified middle and high school teachers to serve as literacy coaches in low performing middle and high schools. It is a joint program between the University of Maryland (UM)/Baltimore City Public Schools (BCPS City Schools)/ Montgomery County Public Schools (MCPS)/Prince George's County Public Schools (PGCPS) serving cohorts of selected middle and high school teachers.

Course	Title	Credits
Required courses:		
EDCI785	Teacher Preparation, Diversity, and Social Change	3
EDCI638		3
EDCI673		3
EDCI632		3
EDCI662		3
EDCI625		3
Total Credits		18

Marine, Estuarine, and Environmental Sciences (MEES)

Graduate Degree Program

College: Computer, Mathematical, and Natural Sciences

Abstract

The specific objective of the university-wide Graduate Program in Marine-Estuarine-Environmental Sciences (MEES) is the training of qualified graduate students, working toward the M.S. or Ph.D. degree, who have research interests in fields of study that involve interactions between biological, physical and chemical systems in the marine, estuarine, freshwater or terrestrial environments. The program comprises six areas of specialization: Ecology, Environmental Chemistry, Environmental Molecular Biology and Biotechnology, Environmental Science, Fisheries Science, and Oceanography. Students work with their Advisory Committee to develop a customized course of study based on research interests and previous experience.

Financial Assistance

University fellowships, research assistantships and traineeships, and teaching assistantships are available. In general, aid provides for full living and educational expenses. Some partial assistance may also be available. Research support from federal, state, and private sources often provides opportunities for additional student support through either research assistantships or part-time employment on research projects.

Contact

Kennedy T. Paynter, Jr., Ph.D.
Director, MEES Graduate Program
1213 HJ Patterson Hall
4065 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6938
Fax: 301.314.4139
Email: mees@umd.edu

Website: http://www.mees.umd.edu

Courses: MEES

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmees.pdf)
- Publications/Presentations

It is particularly important that a student articulate clearly, in the application, a statement of goals and objectives for future work in the field. Because of the interdisciplinary and interdepartmental nature of

the program, only students for whom a specific advisor is identified in advance can be admitted. Prior communication with the faculty in your choice area of specialization is highly encouraged.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	11 Jan	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jan	N/A

Other Deadlines: Please visit the program website at http://www.mees.umd.edu

Requirements

- Marine, Estuarine, and Environmental Sciences, Doctor of Philosophy (Ph.D.) (p. 284)
- Marine, Estuarine, and Environmental Sciences, Master of Science (M.S.) (p. 284)

Facilities and Special Resources

Students may conduct their research in the laboratories and facilities of the College Park (UMCP), Baltimore (UMB), Baltimore County (UMBC), or Eastern Shore (UMES) campuses, in one of the laboratories of the University's Center for Environmental Studies (UMCES): the Chesapeake Biological Laboratory (CBL) at Solomons, Maryland; the Horn Point Laboratory (HPL) near Cambridge, Maryland; and the Appalachian Laboratory (AL) in Frostburg, Maryland; or at the Institute of Marine and Environmental Technology (IMET) in Baltimore. CBL and HPL are located on the Chesapeake Bay. They include excellent facilities for the culture of marine and estuarine organisms. Berthed at CBL are the University's research vessels. At HPL there are extensive marshes, intertidal areas, oyster shoals, tidal creeks, and rock jetties. AL, located in the mountains of western Maryland, specializes in terrestrial and freshwater ecology. On the campuses and at IMET are specialized laboratory facilities for environmental research, including microbiology; biotechnology; water chemistry; cellular, molecular, and organismal biology; and specialized facilities for remote sensing of the environment. Extensive field sites for environmental research are available through the University's agricultural programs and through cooperation with many other organizations in the state.

Marine, Estuarine, and Environmental Sciences, Master of Science (M.S.)

Thesis only: 30 credits

CourseWork

A minimum of 30 credits with 24 credits of course work and 6 credits of graduate research. Of the 24 course credits, 12 of them must be at the 600 level or higher; including,

1. one seminar course (MEES608 or equivalent) must be taken for each year in residence (on average);
2. one approved Statistics course (400 level or higher);
3. one graduate course representing significant interdisciplinary breadth, outside the student's specialization;
4. one course or seminar in management, ethics or philosophy of science.

Thesis Defense

An Oral Defense of the Thesis, administered according to Graduate School regulations, will take place at the completion of the research project. This defense will be conducted by the Advisory Committee and will be administered once all other degree requirements have been fulfilled.

Course	Title	Credits
Core Requirements		
30 credits of coursework including:		30
MEES799	Masters Thesis Research	
Applied Environmental Sciences course		
One seminar for each year of residence in program		
Two professional development courses		
Foundation options:		
Students select one of the following foundations and complete the requirements:		
Environment and Society:		
MEES620		
Electives		
Earth & Ocean Science:		
MEES640		
Electives		
Ecological Systems:		
MEES660		
Electives		
Environmental Molecular Science & Technology:		
MEES680		
Electives		
Total Credits		30

Marine, Estuarine, and Environmental Sciences, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 36 credits, with at least 24 credits of coursework and 12 credits of MEES899. At least 12 credits of coursework must be at the 600 level or above. Up to 16 credits of courses can be waived by petition if the student has completed a M.S. degree.

CourseWork

The student must complete a minimum of 36 credits, with at least 24 credits of course work and 12 credits of dissertation research. Twelve credits of course work must be at the 600 level or above. Coursework completed to fulfill a Master's degree can be applied against this

requirement, up to a maximum of 16 credits. Required course work includes

1. one seminar course (MEES608 or equivalent) is required for each year in residence (on average);
2. one approved Statistics course (600 level or higher);
3. one graduate course representing significant interdisciplinary breadth, outside the student's specialization;
4. one course or seminar in management, ethics or philosophy of science.

Examinations

Formal application for Advancement to Candidacy for the doctoral degree requires successful completion of both a Comprehensive Examination (written and oral components) and an oral Defense of the Dissertation Proposal. The Comprehensive Examination must be passed before the student can defend the Dissertation Proposal. An Oral Defense of the Dissertation will be conducted by the Advisory Committee and will be administered once all other degree requirements have been fulfilled.

Course	Title	Credits
Core Requirements		
Coursework must include the following:		24
MEES608	Seminar in Marine-Estuarine-Environmental Sciences	
One approved statistics course		
One graduate course outside of the chosen specialization		
One course or seminar in Environmental Management		
Dissertation Reseach Requirement		
MEES899	Doctoral Dissertation Research	12
Total Credits		36

Marketing Analytics (BMMA)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial aid is available to qualified full-time and Executive MBA students in the form of fellowships, graduate assistantships, and scholarships.

Contact

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ms_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Courses: BMGT BUAC BUDT BUFN BULM BUMK BUMO BUSI

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/ms-marketing-analytics/admissions

MBA and MS Admissions Office: 301-405-2559
Executive MBA Admissions Office: 301-405-2386
Online MBA Admissions Information: 877-807-8741
PhD Admissions Office: 301-405-2214

Admission criteria for the MS program focusing in marketing analytics are based on: quality of undergraduate and graduate coursework; GMAT or GRE score, 1 letter of recommendation; professional experience; video submission; and written essay of objectives. Prospective applicants may contact the program at (301) 405-2559 for information regarding this MS program.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Marketing Analytics, Master of Science (M.S.) (p. 286)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Marketing Analytics, Master of Science (M.S.)

Non-thesis only: 30 credits required

The MS in Marketing Analytics will give you the cutting-edge knowledge and skills you need to apply marketing analytics to daily business practice. The program will provide you with an in-depth understanding of the mathematical and statistical models and tools needed for customer analysis in the context of marketing problems.

Course	Title	Credits
Required courses:		
BUMK758	Special Topics in Marketing (BUMK758B - Marketing-Based Management)	3
BUMK758	Special Topics in Marketing (BUMK758D - Customer Analysis)	3
BUMK758	Special Topics in Marketing (BUMK758E - Statistical Programming)	3
BUMK758	Special Topics in Marketing (BUMK758F - Business Ethics)	1
BUMK758	Special Topics in Marketing (BUMK758K - Advanced Marketing Analytics)	3
BUMK758	Special Topics in Marketing (BUMK758G - Business Communications)	2
BUMK758	Special Topics in Marketing (BUMK758W - Database Science)	3
BUMK758	Special Topics in Marketing (BUMK758L - Marketing Research and Analysis)	3
BUMK758	Special Topics in Marketing (BUMK758A - Market Forecasting)	2
BUMK758	Special Topics in Marketing (BUMK758H - Business Ethics II)	1
BUMK758	Special Topics in Marketing (BUMK758N - Web Analytics)	2
BUMK758	Special Topics in Marketing (BUMK758M - Retail Analytics)	2
BUMK758	Special Topics in Marketing (BUMK758Q - Action Learning Project)	2
Total Credits		30

Materials Science and Engineering (ENMA)

Graduate Degree Program
College: Engineering

Abstract

Materials Science and Engineering is an interdisciplinary program. Students from engineering and science disciplines receive a solid foundation in the physics and chemistry of materials, thermodynamics and structure of materials, as well as the latest technological aspects of materials in today's manufacturing environment. Faculty research areas are mainly concentrated in the development of novel materials for today's electronics, energy, biomedical and high tech industries. These materials may be bulk or thin film format and range from ceramics, semiconductors, metals, polymer and biomaterials. Departmental faculty members are major participants in the University of Maryland Materials Research Science and Engineering Center (http://mrsec.umd.edu), the Maryland NanoCenter (https://www.nanocenter.umd.edu) and the University of Maryland Energy Research Center (http://www.umerc.umd.edu). For an overview of the Materials Science and Engineering Department, please visit Materials Science and Engineering at the University of Maryland (http://www.mse.umd.edu).

Financial Assistance

Financial assistance in the form of teaching and research assistantships and sponsored fellowships are available to qualified students. Requests for financial assistance will be considered for Fall admission only.

Contact

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College Park, MD 20742
Telephone: 301.405.6809
Email: enmagrad@deans.umd.edu

Website: http://www.mse.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)

- CV/Resume
- Publications/Presentations

The Department offers graduate study leading to the Master of Science (thesis or non-thesis options) and Doctor of Philosophy degrees. In addition, students enrolled in the Professional Master of Engineering program may choose Materials Science and Engineering as a program option. Graduate study is open to qualified students holding a bachelor's degree from accredited programs in any of the engineering and science areas. For detailed admissions and program information, please visit Materials Science and Engineering Graduate Programs (http://www.mse.umd.edu/graduate/admissions)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	30 Nov	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	30 Nov	28 Sep

Other Deadlines: Please visit the program website at http://www.mse.umd.edu

Requirements

- Materials Science and Engineering, Doctor of Philosophy (Ph.D.) (p. 288)
- Materials Science and Engineering, Master of Science (M.S.) (p. 287)

Facilities and Special Resources

Special equipment includes scanning and transmission electron microscopes; X-ray diffraction devices; image analysis and mechanical testing facilities; crystal growing, thin film deposition and analysis equipment; HPLC, GC, IR and other sample preparation and analytical apparatus.

The Laboratory for Advanced Materials Processing (LAMP) in JM Patterson 2225 includes a class 1000 clean room for various kinds of thin film processing, particularly things difficult to acccomplish in the NanoCenter's new FabLab clean room in the Kim Building. LAMP also features custom-designed ultraclean chemical vapor deposition (CVD) and atomic layer deposition (ALD) equipment as the basis for research in nano applications and manufacturing process prototyping, particularly with real-time chemical sensing for metrology and process control. A custom wafer-scanning electrical characterization facility enables resistance and capacitance mapping.

The Nano-Bio Systems Laboratory (NBSL) in JM Patterson 2229 adjoins LAMP and provides capability for biotech research, specifically in biomaterials processing and biomicrosystems development. It includes a Zeiss 310 laser confocal/fluorescence microscope, microfluidic chip testing for biomolecular reaction and cellular response experiments, biomaterials deposition, a Zyvex L200 nanomanipulator system for life science studies, and mass spectrometry and ICP optical emission equipment.

The W. M. Keck Laboratory for Combinatorial Nanosynthesis and Multiscale Characterization in 1141 Kim Building houses several thin film deposition chambers for rapid exploration of novel functional materials. The combinatorial approach allows simultaneous investigation of large numbers of different samples. The combinatorial laser molecular beam epitaxy is used to perform atomic layer controlled combinatorial synthesis of functional materials. Atomically controlled growth of unitcells are monitored in-situ using electron diffraction.

The Advanced Imaging and Microscopy Laboratory (AIM), located in 1237 Jeong H. Kim Building, houses the most electron powerful microscopes within any university in the Washington, DC metro area. The facility has a Field-emission Transmission Electron Microscope (TEM) with 1.4 angstrom resolution and can generate chemical-composition maps of materials using Energy-Dispersive X-Ray Spectroscopy (EDS) or Electron Energy-Loss Spectroscopy (EELS). Also housed in the lab are a thermionic TEM with 2.0 angstrom resolution (capable of in-situ electrical measurements and in-situ observations between -183 C and 1000C) and an electron microprobe with five Wavelength-Dispersion X-Ray Spectrometers (WDS).

Equipment available at other facilities include a Lakeshore vibrating scanning magnetometer and a scanning Auger spectrometer.

For additional information about the department's research facilities, please visit the following webpage: Materials Science and Engineering Research (http://www.mse.umd.edu/research).

Materials Science and Engineering, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

The M.S. degree program offers thesis and non-thesis options. The thesis option requires 24 credit hours of course work plus a thesis. The non-thesis option requires 30 credit hours of course work and a scholarly research paper. All students must complete the Program Core requirements as well as all Graduate School requirements. The University of Maryland's Office of Advanced Engineering Education also offers a Professional Master of Engineering (M.E.) degree with a materials science and engineering option which requires 30 credits of graduate coursework and does not require a thesis.

Course	Title	Credits
ENMA650	Nanometer Structure of Materials	3
ENMA660	Thermodynamics in Materials Science	3
ENMA661	Kinetics of Reactions in Materials	3
ENMA671	Defects in Materials	3
or ENMA620	Polymer Physics	
ENMA688	Seminar in Materials Science and Engineering	3
Thesis or Non-Thesis Requirements		
Select one of the following:		15
Thesis:		
ENMA799	Master's Thesis Research	
Advanced graduate courses		
Non-Thesis:		

ENMA797	Independent Study (Complete a scholarly paper)	
Advanced graduate courses		
Total Credits		30

Materials Science and Engineering, Doctor of Philosophy (Ph.D.)

Students wishing to pursue a Ph.D. must complete 45 credits of core and specialized coursework and a dissertation based on original research. After the completion of the second semester of coursework, the student will take the Ph.D. qualifying examination. Advancement to candidacy occurs after the completion of the core courses with a minimum of 2 grades of A- or higher and 2 grades of B- or higher and successful completion of the qualifying examination.

Course	Title	Credits
Required courses:		
ENMA650	Nanometer Structure of Materials	3
ENMA660	Thermodynamics in Materials Science	3
ENMA661	Kinetics of Reactions in Materials	3
ENMA671	Defects in Materials	3
or ENMA620	Polymer Physics	
ENMA688	Seminar in Materials Science and Engineering	3
Remainder of coursework		12
Dissertation Research Requirements		
ENMA899	Doctoral Dissertation Research	18
Total Credits		45

Materials Science and Engineering (PMMS)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Materials Science and engineering degree programs empower students to solve important scientific and technical problems through advancements in the underlying materials systems. Multidisciplinary courses and access to advanced laboratories also position graduates to become leaders in the field.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/materials-science-engineering.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Materials Science and Engineering, Master of Engineering (M.Eng.) (p. 289)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Materials Science and Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENMA650	Nanometer Structure of Materials	3
ENMA660	Thermodynamics in Materials Science	3
ENMA661	Kinetics of Reactions in Materials	3
Electives approved by advisor		21
Total Credits		30

Materials Science and Engineering (Z060)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Materials Science and engineering degree programs empower students to solve important scientific and technical problems through advancements in the underlying materials systems. Multidisciplinary courses and access to advanced laboratories also position graduates to become leaders in the field.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/materials-science-engineering.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Materials Science and Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 290)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Materials Science and Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENMA461	Thermodynamics of Materials	3
ENMA650	Nanometer Structure of Materials	3
ENMA661	Kinetics of Reactions in Materials	3
One additional course approved by advisor		3
Total Credits		12

Maternal and Child Health (MCHS)

Graduate Degree Program
College: Public Health

Abstract

Maternal and Child Health is an interdisciplinary field in which empirical research, epidemiological data, and policy analyses are used to understand individual, family, community, and sociocultural factors that influence health behaviors, health outcomes, and use of health services by mothers, children, adolescents, and their families (including fathers). The MCH program prepares students to advance research, policy, and practice to improve the health, safety, and well-being of these groups, with a particular emphasis on low income and ethnic minority populations. The program equips students to address MCH issues at both the family and population levels. It is unique in its focus on the whole family system and family health policy.

Ph.D. graduates in MCH are prepared for academic and research positions in colleges and universities; high level administrative or research positions in city/county/state/national health and human service agencies; and leadership positions in nongovernmental and advocacy organizations. MCH graduates are also increasingly hired by private healthcare organizations such as hospitals, HMOs, and health insurers.

The Department of Family Science prepares students to describe, explain, and improve the quality of family life through applied research, education, therapy, human services, policy analysis, and advocacy. The approach is interdisciplinary, emphasizing individual, interpersonal, and social change. The program of study is based on a systems or ecological paradigm, combining the perspectives of interrelated professional fields of maternal and child health, family science, couple and family therapy, family policy, behavioral science, and human services. Graduates are prepared for careers in the public, non-profit and private sectors, including university teaching, research, family policy analysis, and administrative positions in human service and public health programs.

Financial Assistance

Fellowships and Graduate Assistantships are available to students admitted into the MCH Ph.D program.

Contact

For additional information, please contact: Dr. Sandra Quinn (MCH Program Director) or Dr. Kevin Roy (Graduate Director).

Maternal and Child Health Ph.D. Program
Department of Family Science
1142 School of Public Health Building
4200 Valley Drive
University of Maryland
College Park, MD 20742
Phone: 301.405.3672
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Website: http://www.sph.umd.edu

Relationships: Family Science (FMSC) (p. 201)

Admissions

The Department seeks imaginative, intelligent, and highly motivated students with a desire for challenge, a commitment to excellence, and a well-developed sense of social responsibility. Applicants must have a Master's Degree in Public Health or a relevant behavioral or social science discipline. Students with Master's Degrees other than an MPH must complete missing courses (biostatistics, epidemiology) within one academic year of their entry into the program.

We are fortunate to attract gifted students who are concerned about public health, social and ethical issues and who view their future profession in a broad context.

Students are selected on the basis of:

- performance in previous undergraduate and/or graduate coursework
- the strength of GRE scores taken within the last five years
- letters of recommendation
- quality of empirical Master's Thesis (for those with a Master's degree)
- relevant work experience
- professional goals congruent with those of the program

Applicants to the MCH Ph.D. program should have an MPH degree or a social/behavioral science master's degree that focuses on family, maternal, and/or child health issues (including mental health). Students without the MPH degree must complete the required 5 public health core courses (biostatistics, epidemiology, environmental health, health services administration, and social and behavioral sciences) within one academic year of their entry into the program. Applicants should also have a minimum undergraduate GPA of 3.0 and a minimum graduate GPA of 3.0.

Important: Applicants to the Maternal and Child Health Ph.D. program are required to submit two applications for admission. First, they will submit an application to SOPHAS and second, they will submit a separate application to the University of Maryland.

Go to http://www.sophas.org/ to fill out an application to SOPHAS. An application to the SOPHAS system is $120, which will cover all public health programs to which a student chooses to apply. All applicants to the MCH program must submit the following supporting documentation:

- The SOPHAS application form
- Official transcripts from all academic institutions from which you earned credit
- Official GRE test scores, taken within the last 5 years (Institution Code: 0485)
- Three letters of recommendation
- Statement of Purpose and Objectives
- CV/Resume

Approximately one week after application to SOPHAS, applicants will receive an email from the University of Maryland College Park Graduate School with instructions for completing the second supplemental application. They will be directed to the application and a $75 non-refundable fee will be processed when it is submitted. Students submit the following information:

- Maryland Residency Information
- Emergency Contact Information
- Demographics

All information required for this application should be submitted on-line and will be sent directly by Graduate Admission to the Department of Family Science for review. No additional hard copies are required.

Standardized test scores (GREs) are to be sent directly from Educational Testing Service (if no category exists on ETS form, please fill in 'other' and write FMSC, code 5814). GREs must be taken in time to reach our department before the December 15th deadline. Allow 2 weeks to receive your scores.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Priority: 16 Nov / Final: 14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Priority: 16 Nov / Final: 14 Dec

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Maternal and Child Health, Doctor of Philosophy (Ph.D.) (p. 291)

Facilities and Special Resources

Center for Healthy Families: This Center is the training and research arm of the Couple and Family Therapy Program in the Department of Family Science. Departmental graduate students and faculty provide clinical and educational services to families from surrounding communities in this state-of-the-art facility. Master's and doctoral students use data collected at the Center for research projects.

The University's close proximity to the nation's capital, the state capital in Annapolis, federal executive departments, and headquarters of national professional and public interest associations provide research and internship placements for studying family policy unmatched by any other graduate program in the discipline. The Washington-Baltimore metropolitan area offers rich opportunities for research on culturally and socioeconomically diverse families. The campus and department have excellent computer facilities. Students have ready access to the University's extensive library systems, as well as holdings from the Library of Congress, the National Institutes of Health, National Library of Medicine, National Archives, and many other library collections.

Maternal and Child Health, Doctor of Philosophy (Ph.D.)

Doctoral students must complete 51 credits beyond the master's degree. Students must also complete a research internship, pass a qualifying exam, and complete a dissertation and oral defense.

The Maternal and Child Health Ph.D. program requires 51 graduate credit hours beyond the master's degree, including a maternal and child health core (24 credits), a research methods core (15 credits), and the dissertation (12 credits). Students in the PhD program advance to candidacy after completing required coursework and passing a written qualifying examination. After advancement to candidacy, students must complete a dissertation proposal and oral defense, followed by doctoral dissertation and oral dissertation defense.

This program provides interdisciplinary training in research, practice, and policy relevant to health problems and services for women, infants, children, adolescents, and their families (including men). The MCH program prepares students to advance research, policy and practice to improve the health, safety, and well-being of these groups, with a particular emphasis on low income and ethnic minority populations.

Students admitted full-time to the Ph.D. program post-master's can complete this program within three years.

Course	Title	Credits
Required courses:		
FMSC606	Ethnic Families and Health Disparities	3
FMSC660	Program Planning and Evaluation in Family Science	3
FMSC689	Research Internship	3
FMSC710	Maternal and Child Health from a Life Course Perspective	3
FMSC720	Study Design in Maternal Child Health Epidemiology	3
FMSC730	Key Topics in Maternal and Child Health	3
FMSC750	Family and Health Policy	3
FMSC780	Qualitative Methods in Family and Health Research	3
FMSC850	Maternal & Child Health Epidemiology	3
EPIB650	Biostatistics I	3
EPIB651	Applied Regression Analysis	3
Electives approved by Graduate Director		6
Dissertation Research Requirements		
FMSC899	Doctoral Dissertation Research	12
Total Credits		51

Mathematical Statistics (STAT)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Statistics Program offers the Master of Arts and Doctor of Philosophy degrees for graduate study and research in statistics and probability. Areas of faculty research activity include high dimensional data, statistical decision and estimation theory, biostatistics, stochastic modeling, robust and nonparametric inference, semiparametric inference, categorical data analysis, theory and inference for stochastic processes, stochastic analysis, time series and spatial statistics. Students may concentrate in applied or theoretical statistics by selecting an appropriate sequence of courses and a research area to form an individual plan of study. The Program has been designed with sufficient flexibility to accommodate the student's background and interests. The Program also offers students from other disciplines an opportunity to select a variety of statistics courses to supplement their own study.

Biostatistics/Bioinformatics Specialization:

Biostatistics/Bioinformatics is an important research field in Statistics with immensely broad applications in public health, medical, and biological research. Bioinformatics is an emerging field with rapid development and has significant overlap with Biostatistics. The Bioinformatics/Biostatistics (STAT-BB) concentration addresses the increasing research opportunities and the educational needs of this burgeoning field. See https://stat.umd.edu/stat-graduate/stat-bb.html for details.

The Program is administratively affiliated with the Department of Mathematics, which maintains the records of all students in the Mathematical Statistics Program and handles correspondence with those applying for admission. However, any application for admission must indicate clearly that the student wishes to enter the Statistics (STAT) Program.

Employment prospects for statisticians are very good. All recent M.A. and Ph.D. graduates of Maryland's Statistics Program have found jobs in academia, industry and government agencies.

Financial Assistance

Graduate assistantships are awarded to Ph. D. students in the Statistics Program through the Mathematics Department. At present, the teaching load is six hours each semester, in addition to the duties of meeting with students and grading papers. There are approximately 20 graduate students in statistics with financial support. These are mostly teaching assistantships, but there are also a few research assistantships and fellowships. From time to time advanced students are placed into research assistantships as data analysts or statistical consultants with other campus units. Applications for financial aid are only processed once a year, for admission for the fall semester.

Contact

Paul J. Smith
Professor and Director
Mathematical Statistics Program
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University of Maryland
College Park, MD 20742
Telephone: 301.405.5061
Fax: 301.314.0827
Email: math-grads@umd.edu (math-grads@umd.edu)

Website: http://stat.umd.edu

Courses: STAT

Relationships: Applied Mathematics & Statistics, and Scientific Computation (AMSC) (p. 48)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements)): TOEFL/IELTS required even if eligible for waiver.

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- GRE Subject (Math): GRE Math Subject required for funding and highly recommended for all others.
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmathandstat.pdf)
- Publications/Presentations
- Advanced Textbooks (section of application)

Spring admission does not offer financial support of any kind. Applicants should also contact department prior to application.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	18 Jan	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	18 Jan	28 Sep

Other Deadlines: Please visit the program website at http://stat.umd.edu

Requirements

- Mathematical Statistics, Doctor of Philosophy (Ph.D.) (p. 293)
- Mathematical Statistics, Master of Arts (M.A.) (p. 293)

Facilities and Special Resources

The STAT Program cooperates closely with the Mathematics Department and the Applied Mathematics, Statistics and Scientific Computation (AMSC) Program. The Program's faculty are actively involved in research in applied and theoretical areas of statistics and maintain close ties with applied scientists in several federal agencies.

The Program sponsors weekly seminars in Statistics and in Probability. In addition, Research Interaction Teams (RIT's) cover topics of current statistical interest.

Computing is integrated into the applied courses, and the Program also offers a course "Computational Methods in Statistics"

By scheduling many of its applied and Master's level courses in late-afternoon time slots, the Program facilitates and invites part-time graduate study.

Mathematical Statistics, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

The M.A. degree program offers both thesis and non-thesis options; applicants are encouraged to choose the latter. For the non-thesis option, a student must complete 30 credit hours with at least a B average; at least 18 of these credits must be at the graduate level (600/700 level) and at least 12 of the graduate credits must be in Statistics (STAT). The student must also pass at least two Mathematics Department written examinations in Probability, Mathematical Statistics and one more area, such as Applied Statistics or any field of mathematics. Students may complete the qualifying exam requirements either by taking a third exam or by achieving acceptable grades in a specific list of graduate STAT courses. In order to earn the M.A. degree with the non-thesis option, the student must pass two examinations by the end of his or her third year in the graduate program, and must pass complete the qualifying requirements at the M. A. level by the end of the fourth year. A student may take one or more examinations at a time. Most full-time students complete the qualifying requirements by the end of the second year or middle of the third year. The student must also submit a satisfactory short scholarly paper.

For the thesis option, a student must:

1. complete 24 credit hours with at least 15 at the 600/700 level (of these 15 hours, at least 12 hours must be in Statistics);
2. maintain an average grade of B or better;
3. take six hours of STAT799 (Research) in addition to (1);
4. write a satisfactory thesis; and
5. pass a final oral examination

There is no foreign language requirement for M.A. students.

Applicants should keep in mind that no financial aid is offered to M.A. students.

Thesis Option

Course	Title	Credits
Core Requirements		
Select 24 credits of coursework [1]		24
STAT799	Master's Thesis Research	6
Pass a final oral examination		
Total Credits		30

[1] At least 15 credits at the 600-700 level and at least 12 credits at the 600-700 level in statistics and probability.

Non-Thesis Option

Course	Title	Credits
Core Requirements		
Select 30 credits of coursework [1]		30
Pass the Master's written examinations or the Ph.D. written examinations on the Master's level		
Write a scholarly paper		
Pass a final oral examination		
Total Credits		30

[1] At least 18 credits at the 600-700 level and at least 12 credits at the 600-700 level in statistics and probability.

Mathematical Statistics, Doctor of Philosophy (Ph.D.)

The M.A. degree is not required for admission to the Ph.D. program. A doctoral student must complete a minimum of 36 hours of formal courses (at least 27 at the 600/700 level) with an average of B or better; at least 18 of the graduate credits must be taken in Statistics. In addition, the university requires at least 12 hours of STAT899 (Doctoral Research). The Ph.D. student must pass at least two written examinations in Probability, Mathematical Statistics, and a third exam in Applied Statistics or any field of mathematics. The qualifying requirements may be satisfied by passing three written exams or by satisfactory performance in a specified list of courses. These examinations are given by the Mathematics Department twice a year in January and August. A student may take one or more examinations at a time. The student must

pass two examinations by the end of his or her third year in the graduate program, and must complete the qualifying requirments by the end of the fourth year. Most full-time students complete the qualifying requirements by the end of the second year or middle of the third year. If successful in the qualifying requirements, the student must pass an oral examination. Administered by the Statistics faculty, the oral examination usually takes place a year after the student passes the written examination. This examination serves as a test of the student's in-depth preparation in the area of specialization and the student's research potential. Successful completion of the oral exam indicates that the student is ready to begin writing the doctoral dissertation. In addition, the Department requires a reading competence in one foreign language for the Ph.D. The student may select one of three languages: French, German or Russian.

Administered and graded by the Mathematics Department, the language examination consists of translating foreign mathematical texts into competent English. To be admitted to candidacy, the Ph.D. student must pass the written examinations and the oral examination and the language examination must be completed before the candidate's final oral examination on the dissertation.

Course	Title	Credits
Core Requirements		
Select 36 credits of coursework [1]		36
Pass the written examination in three fields at the Ph.D. level, including probability and one statistics area		
Pass a foreign language exam		
Pass the final oral examination		
Dissertation Research Requirement		
STAT899	Doctoral Dissertation Research	12
Total Credits		48

[1] At least 27 credits at the 600-700 level and at least 18 credits at the 600-700 level in statistics and probability.

Mathematics of Advanced Industrial Technology (MAIT)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

This program is not accepting new students at this time. Please visit our graduate program listing (p. 18) for other related programs.

Abstract

The Norbert Wiener Center, a research and educational unit in the Department of Mathematics at the University of Maryland, College Park, offers a professional Masters degree focusing on the modern mathematical methods and algorithms that underlie today's cutting-edge engineering: The Mathematics of Advanced Industrial Technology (MAIT).

Our program is designed for individuals working in mathematical engineering who are looking for a fast track to understanding and applying the most up-to-date ideas in their current and future projects. Undergraduate degree holders can advance to the Masters level, and Masters degree holders can advance their applicable skills.

In addition to the professional Masters degree, we also offer two certificate programs. For students wishing to enhance their career skills in specific subject matter, the Center also offers a Graduate Certificate in Mathematics of Advanced Industrial Technology to students completing 4 courses (12 credits) within the program. The Norbert Wiener Center also offers a specific Graduate Certificate concentration in Computational Harmonic Analysis. This 12-credit program is tailored to working engineers and scientists wishing to advance their understanding of the latest Fourier, Wavelet, and Time-Frequency Harmonic Analysis methods and algorithms.

Fields including RF and Optical Communications, Signal and Image Processing, Sensor Networks, RADAR and SONAR, Navigations and Avionics, Medical Imaging and Diagnostics, Control Systems, and Robotics, increasingly rely on fast, embedded mathematical algorithms executing on the latest microprocessors, micro-controllers, and DSP cores. Budding fields such as Bioinformatics, Nanotechnology, Data Mining, and Quantum Computing are likewise being built from the ground up around modern mathematical methods. Engineers and scientists that understand advanced mathematical toolsets will have the edge in creating tomorrow's technologies.

The Norbert Wiener Center's educational mission is to teach the mathematics of modern engineering in an accessible and applicable manner. Our faculty is drawn from both academia and industry in order to balance theoretical and "hands on" approaches in the most constructive way. Our courses offer the latest information while tying modern theory directly to application by incorporating industry standard tools. Graduates of the Norbert Wiener Center will be well equipped to apply the latest mathematical tools to advance both their projects and their careers.

The most up-to-date information about the MAIT program can be found on our website at www.mait.umd.edu

Contact

Program Coordinator
Norber Wiener Center
Department of Mathematics
2211 William E Kirwin Hall
4176 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5158
Fax: 301.314.6710
Email: mait@math.umd.edu

Website: http://www.norbertwiener.umd.edu

Admissions

This program is not accepting new students at this time. Please visit our graduate program listing (p. 18) for information on other programs.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.norbertwiener.umd.edu

Requirements

- Mathematics of Advanced Industrial Technology, Master of Mathematics of Advanced Industrial Technology (M.M.A.I.T.) (p. 295)

Facilities and Special Resources

Courses for the MAIT program will be taught in the evening at the College Park Campus and also at sites in northern Virginia. The MAIT program is administered by the Norbert Wiener Center for Harmonic Analysis and Applications which is located within the Mathematics department on the second floor of the Mathematics building on Campus Drive in College Park

Mathematics of Advanced Industrial Technology, Master of Mathematics of Advanced Industrial Technology (M.M.A.I.T.)

The Master of Mathematics of Advanced Industrial Technology (MAIT) degree requires 10 classes (30 credits) to be completed with a GPA of 3.0 or higher. Coursework must include 3 core subjects (MAIT613, MAIT623, and MAIT633), as well as electives chosen from a host of options. Coursework also must include a one or two-semester practical project course under the guidance of a faculty member. The project course may be employer-work related. The student's faculty advisor must approve program coursework.

Course	Title	Credits
MAIT613		3
MAIT623	Modern Mathematical Methods of Signal and Image Processing I	3
MAIT633		3
Select 7 courses of electives		21
Total Credits		30

Mathematics of Advanced Industrial Technology (Z022)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

This certificate is not accepting new students at this time. Please visit our graduate program listing (p. 18) to view other certificates.

Website: http://www.norbertwiener.umd.edu

Admissions
Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.norbertwiener.umd.edu

Requirements

- Mathematics of Advanced Industrial Technology, Post-Baccalaureate Certificate (P.B.C.) (p. 295)

Mathematics of Advanced Industrial Technology, Post-Baccalaureate Certificate (P.B.C.)

For students wishing to enhance their career skills in specific subject matter, the Center also offers a Graduate Certificate in Mathematics of Advanced Industrial Technology to students completing 4 courses (12 credits) within the program. Coursework will include at least 2 of the core subjects and 2 listed electives to be completed with a GPA of 3.0 or higher.

Mathematics (MATH)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

Three programs are currently closely affiliated with the Mathematics Department: the Mathematics Program (MATH), the Applied Mathematics & Statistics, and Scientific Computation Program (AMSC), and the Mathematical Statistics Program (STAT). Students applying for admission should use the appropriate symbol to indicate their program of interest. The interdisciplinary Applied Mathematics & Statistics, and Scientific Computation Program offers three concentrations, one in applied mathematics, one in scientific computation, and one in applied statistics. The Statistics Program is concerned with mathematical statistics and probability. The AMSC and STAT programs are described in detail elsewhere in this catalog.

Students can earn a Doctor of Philosophy degree in the Mathematics Program. **The Master's degree is not offered** unless it is en route to a Ph.D. The master's degree is not required for entrance to the Ph.D. program.

The Mathematics Program offers graduate programs in algebra and algebraic geometry, complex analysis, dynamical systems and chaos, geometry, harmonic analysis, mathematical logic, number theory, numerical analysis, ordinary differential equations, partial differential equations, probability, real and functional analysis, representation theory, statistics and topology.

Financial Assistance

The MATH program is expecting to support about 12 new doctoral students each Fall. Offers of support are generally made for up to five years, contingent on the student making satisfactory academic progress. Except for unusual circumstances, offers of financial aid will not be made to applicants seeking a Master's degree. The normal teaching load is four

to six hours per week of classroom teaching in addition to the duties of meeting with students and grading papers. Sometimes fellowships and research assistantships are also available.

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Courses: MATH

Relationships: Applied Mathematics & Statistics, and Scientific Computation (AMSC) (p. 48) **Mathematical Statistics (STAT)** (p. 292)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements)): TOEFL/IELTS required even if eligible for waiver.

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- GRE Subject (Math)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationling.pdf)
- Publications/Presentations
- Advanced Textbooks (section of application)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	18 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	18 Jan

Other Deadlines: Please visit the program website at http://www-math.umd.edu

Requirements

- Mathematics, Doctor of Philosophy (Ph.D.) (p. 297)
- Mathematics, Master of Arts (M.A.) (p. 296)

Facilities and Special Resources

The Department is actively involved in research in a number of areas, strengthened further by a complement of mathematicians from the Institute for Physical Science and Technology. The Department fosters a lively program of seminars and colloquia; about half of these talks are given by outside specialists. In addition the department has a tradition of hosting distinguished long term visitors who give series of seminar talks or teach semester long courses.

The Engineering and Physical Sciences Library is located on the ground floor of the Mathematics Building and contains more than 95,000 volumes in mathematics, physics and engineering, and more than 280 journals in pure and applied mathematics. The Library of Congress, with its extensive collection of books and technical reports, is only a half hour from campus.

The Department has a large network of computers mostly running Linux. The Department houses a computer classroom and a Mathematical Visualization Lab, and similar labs are scattered across campus. There are computers in almost all graduate student offices, and many of the other computers on campus are available for student use.

The Department cooperates closely with the Institute for Physical Science and Technology and with the Department of Computer Science. Faculty members of both groups offer courses in the Department. Computer facilities are available to serve the research needs of both faculty and graduate students. Members of the Department participate actively in the interdisciplinary AMSC Program, and they also staff the Mathematical Statistics Program.

Mathematics, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

Please note: Students cannot apply to the M.A. degree. The M.A. can only be awarded on route to the Ph.D. All students interested in earning the M.A. must be doctoral students.

The M.A. degree program offers both a thesis and non-thesis option; most students choose the latter. The non-thesis option requires students to take 30 credit hours with an average of at least a B. At least 18 credits must be at the 600/700 level, including at least 12 hours in mathematics. Also, students must complete two full-year sequences at the 600/700 level, except that a suitable "Selected Topics" course may be substituted for the second part of one of these full-year courses. Additionally, students must pass Departmental written examinations in two different mathematical fields at the Master's level, and write a scholarly paper.

The thesis option requires a total of 24 hours of courses carrying graduate credit of which at least 15 are at the 600/700 level. Of these 15 hours at least 12 must be in mathematics. Of these 12 hours, at least 3 hours must be in each of two fields of mathematics distinct from the one in which the thesis is written, and must be passed with a grade of B or better. The student must also take 6 hours of thesis research, write a satisfactory thesis, and pass a final oral examination.

The M.A. degree includes no foreign language requirement. Generally it takes two to three years to earn the M.A., and approximately 20 degrees are granted each year in mathematics (MATH, STAT, and AMSC combined).

The department also has a 5-year program to earn a combined M.A./B.S. degree. The requirements for this program include the requirements for both the B.S. degree and the M.A. degree, with 9 hours of overlapping credits. Either the thesis or non-thesis option for the M.A. degree is available in this program.

Thesis Option

Course	Title	Credits
Core Requirements		
Select 24 credits of coursework [1]		24
MATH799	Master's Thesis Research	6
Pass a final oral examination		
Total Credits		30

[1] At least 15 credits at the 600-700 level and at least 12 credits at the 600-700 level in mathematics.

Non-Thesis Option

Course	Title	Credits
Core Requirements		
Select 30 credits of coursework [1]		30
Pass two written exams at the Master's level		
Complete the corresponding coursework		
Write a scholarly paper		
Pass a final oral examination		
Total Credits		30

[1] At least 18 credits at the 600-700 level and at least 12 credits at the 600-700 level in mathematics

Mathematics, Doctor of Philosophy (Ph.D.)

The Ph.D. program does not require an M.A. degree, but applicants who are accepted should show, on the basis of their undergraduate record and recommendations, that they possess not only marked promise in mathematical activities but the potential to perform on a creative level. Like the M.A. program, admission may be granted on a provisional basis.

Students in the Ph.D. program must complete a minimum of 36 hours of formal coursework (at least 27 at the 600/700 level) with an average grade of B or better; at least 18 hours must be taken in the Department of Mathematics. In addition, the university requires at least 12 hours of MATH899 (Doctoral Research). Ph.D. students must pass two qualifying exams, and in addition must take and pass four semesters of courses from a specific list with a grade of B or better, and an overall grade point average of at least 3.3 in these four courses (these courses constitute the third and final qualifying exam requirement). These four courses must be distinct from the ones supporting the qualifying exams. The purpose of the written qualifying exams is to indicate that the student has the basic knowledge and mathematical ability to begin advanced study. Passing the exams is thus supposed to certify understanding of (selected) first-year graduate material. These examinations are given twice a year, in January and August. A student may take one or more examinations at a time. The two qualifying exams and four additional courses, must be passed/completed by January of the student's third year in the graduate program. If successful in these written examinations and courses, students must do advanced reading and coursework in their special area of interest before they can be admitted to candidacy and begin dissertation research. The dissertation must represent an original contribution to mathematical knowledge and is usually published in a mathematical journal.

Generally Ph.D. students spend about six years before obtaining the degree. The combined programs of mathematics, applied mathematics and statistics award an average of 18 Ph.D.s each year. The Ph.D. program has a foreign language requirement. Before a student can schedule the Final Oral Examination, he or she must pass a written examination in either French, German or Russian. The language examinations are composed and graded within the Department and involve translating a passage from a mathematical text into competent English.

Course	Title	Credits
Core Requirements		
Select 36 credits of coursework [1]		30
Pass the written examination requirements		
Pass a foreign language exam		
Pass a final oral examination		
Dissertation Research Requirements		
MATH899	Doctoral Dissertation Research	12
Total Credits		42

[1] At least 27 credits at the 600-700 level and at least 18 credits in the Department of Mathematics.

Measurement, Statistics and Evaluation (EDMS)

DGraduate Degree Program
College: Education

Abstract

Measurement, Statistics and Evaluation offers graduate study leading to the Master of Arts or Doctor of Philosophy degrees for students with strong interests in research methods and their applications. Students pursuing Doctoral degrees in other programs may enroll in a dual degree program leading to the Master's degree in Measurement, Statistics and Evaluation, or there is also a 21-credit certificate program for doctoral students. For select undergraduates, there is a five-year Bachelor's/Master's program in Measurement, Statistics and Evaluation. Please note that for those PhD applicants who are hoping to receive a funding offer, you should adhere to the **preferred deadlines** on the program website and not the deadlines listed below.

Financial Assistance

Graduate teaching assistantships, research assistantships, and fellowships are available. The Department can usually aid students in locating part-time employment opportunities, both on and off campus, as well as providing funding from its own contracts and grants.

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Website: http://www.education.umd.edu/Academics/Departments/HDQM/academic/degreePrograms/mseval.html

Courses: EDMS

Keywords: Doctoral students may emphasize areas such as Applied Statistics, Psychometrics, or Program Evaluation. Graduates teach at the university/college level, do original methodological research and serve as specialists in school systems, industry or government. The Master's program provides students with the data management, analysis, assessment and computer skills to serve as research associates.

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)

In addition to Graduate School requirements, admission decisions are based on the quality of previous undergraduate and graduate work, strength of letters of recommendation from persons competent to judge the applicant's likelihood of success in graduate school, scores on the Graduate Record Examination, and the applicant's statement of academic and career objectives in relation to the program of study to be pursued. Students who seek admission should display strong evidence of aptitude and interest in quantitative methods. Programs of study may be designed to meet the individual needs of both full-time and part-time students since many courses are offered in the late afternoon or evening.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred: 15 Nov / Final: 1 Mar	30 Aug
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Preferred: 15 Nov / Final: 1 Feb	30 Aug

Other Deadlines: Please visit the program website at http://www.education.umd.edu/Academics/Departments/HDQM/academic/degreePrograms/mseval.html

Requirements

- Measurement, Statistics and Evaluation, Certificate of Advanced Study (C.A.S.) (p. 298)
- Measurement, Statistics and Evaluation, Doctor of Philosophy (Ph.D.) (p. 299)
- Measurement, Statistics and Evaluation, Master of Arts (M.A.) (p. 298)
- Measurement, Statistics and Evaluation, Master of Education (M.Ed.) (p. 299)

Facilities and Special Resources

The Department maintains computer equipment and high performance server with up-to-date statistical software packages. The faculty are actively engaged in a large variety of basic and applied research projects and students are encouraged to become involved in these activities. The Washington and Baltimore areas have numerous organizations that provide opportunities to become involved in projects that have national importance.

Measurement, Statistics and Evaluation, Certificate of Advanced Study (C.A.S.)

The Certificate in Measurement, Statistics and Evaluation (p. 299) is designed to provide advanced training in quantitative methods for graduate students majoring in other doctoral programs. The certificate requires a minimum of 21 graduate credit hours. In addition, an advisor must be selected from members of the Measurement, Statistics and Evaluation faculty.

Measurement, Statistics and Evaluation, Master of Arts (M.A.)

Thesis or Non-thesis option: 30 credits required

The Measurement, Statistics and Evaluation M.A. degree program requires a minimum of 30 credit hours. Both thesis and non-thesis options are available. A written comprehensive examination is required for both options and a research paper is required for the non-thesis option.

Course	Title	Credits
Required courses:		
EDMS623	Applied Measurement: Issues and Practices	3
EDMS646	General Linear Models I	3
EDMS647	Causal Inference and Evaluation Methods	3
EDMS651	General Linear Models II	3
EDMS655	Introduction to Multilevel Modeling	3
EDMS657	Exploratory Latent and Composite Variable Methods	3
EDMS724	Modern Measurement Theory	3
Thesis or Non-Thesis Requirements		
Select one of the following:		9

Thesis:		
EDMS799	Master's Thesis Research	
Elective		
Non-Thesis:		
Electives		
Total Credits		30

Measurement, Statistics and Evaluation, Master of Education (M.Ed.)

The M.Ed. option is not currently offered.

Measurement, Statistics and Evaluation, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 66 credits including 12 credits of EDMS899 and 21 credits of electives.

The Ph.D. program requires both preliminary and comprehensive examinations; the comprehensive examination is designed to assess broad, integrated understanding as well as the student's specialization. All students are expected to engage in research. Measurement, Statistics and Evaluation does not currently offer the Ed.D. degree.

Course	Title	Credits
Required courses:		
EDMS623	Applied Measurement: Issues and Practices	3
EDMS626	Instrumentation	3
EDMS646	General Linear Models I	3
EDMS647	Causal Inference and Evaluation Methods	3
EDMS651	General Linear Models II	3
EDMS655	Introduction to Multilevel Modeling	3
EDMS657	Exploratory Latent and Composite Variable Methods	3
EDMS722	Structural Modeling	3
EDMS724	Modern Measurement Theory	3
EDMS779	Seminar in Applied Statistics	3
EDMS787	Bayesian Inference and Analysis	3
Electives		21
Dissertation Research Requirements		
EDMS899	Doctoral Dissertation Research	12
Total Credits		66

Measurement, Statistics & Evaluation (Z019)

Graduate Certificate Program
College: Education

Abstract

The **Certificate in Measurement, Statistics and Evaluation** is a 21-credit certificate designed to provide advanced training in quantitative methods for doctoral students majoring in other programs.

Note: To enroll in this Certificate program you must currently be a doctoral student in a University of Maryland program other than EDMS

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Website: http://www.education.umd.edu/Academics/Departments/HDQM/academic/degreePrograms/mseval.html

Admissions

Contact the coordinator listed below for admissions information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.education.umd.edu/Academics/Departments/HDQM/academic/degreePrograms/mseval.html

Requirements

- Measurement, Statistics & Evaluation, Post-Baccalaureate Certificate (P.B.C.) (p. 299)

Measurement, Statistics & Evaluation, Post-Baccalaureate Certificate (P.B.C.)

Total Credits: 21 credits required

The Certificate in Measurement, Statistics and Evaluation is designed to provide advanced training in quantitative methods for graduate students majoring in other doctoral programs. The certificate requires a minimum of 21 graduate credit hours. In addition, an advisor must be selected from members of the Measurement, Statistics and Evaluation faculty.

Course	Title	Credits
Required courses:		
EDMS623	Applied Measurement: Issues and Practices	3
EDMS646	General Linear Models I	3
EDMS647	Causal Inference and Evaluation Methods	3
EDMS651	General Linear Models II	3
Electives		9
Total Credits		21

Mechanical Engineering (ENME)

Graduate Degree Program
College: Engineering

Abstract

The Department of Mechanical Engineering offers graduate study leading to the Master of Science and Doctor of Philosophy degrees. In addition, students may pursue a Master of Engineering degree through the Professional Master's Program of the Office of Advanced Engineering Education. The Department's instruction and research are carried out through the following four divisions:

1. Design and Reliability of Systems;
2. Electronic Products and Systems;
3. Mechanics and Materials; and
4. Thermal, Fluids and Energy Sciences.

Design and Reliability of Systems

(Formerly known as Design, Risk Assessment and Manufacturing) - The focus of this area of concentration is the study of:

- Product and process design and decision making;
- Manufacturing system modeling and automation;
- Manufacturing process modeling and control;
- Reliability and failure modes associated with specific semiconductor devices;
- Manufacturing technology designed specifically to meet high standards for yield and quality;
- Reliability test methods for various electronic or mechanical devices;
- Test screening of parts or systems to eliminate latent defects;
- Reliability and safety assessment tools for complex aerospace, nuclear, or chemical process systems.

Electronic Products and Systems

This area of concentration addresses the fundamental methods to attain more cost-effective and reliable electronic packaging. Areas of specialization include:

- Electronic packaging;
- Materials characterization;
- Acceleration testing;
- Condition monitoring;
- Computer aided life cycle engineering (CALCE).

Mechanics and Materials

This division concentrates on the study of analytical and experimental fundamentals of mechanics and materials. Areas of specialization include:

- Computational modeling;
- Control systems;
- Design, characterization, and manufacturing of materials;
- Elasticity;
- Experimental mechanics;
- Fracture mechanics;
- Linear and nonlinear mechanics;
- Micro-nano-bio systems;
- Noise and vibration control;
- Nonlinear dynamics;
- Robotics and intelligent machines;
- Smart structures.

Thermal, Fluids and Energy Sciences

This division encompasses two broad disciplines: thermal science and fluid mechanics. Areas of specialization include:

- Heat transfer;
- Combustion;
- Energy systems analysis;
- Hydrodynamics;
- Turbulence;
- Computational fluid dynamics (CFD).

Reliability and Risk Engineering

This program covers aspects of engineering related to reliability and risk assessment. The primary areas of specialization include:

- Microelectronic reliability;
- Reliability analysis;
- Risk analysis;
- Software reliability.

Financial Assistance

Financial assistance is available to highly qualified students in the form of research and teaching assistantships. The most outstanding applicants are offered fellowships. Students seeking financial assistance should submit with their applications a current resume or CV as well as a statement regarding their qualifications and/or past research or teaching experience. Financial assistance is sought for all worthy students. For example, the following fellowships are available for incoming Ph.D students; Dean's Fellowships (supplements Teaching Assistantships and Research Assistantships (managed by the A. James Clark School of Engineering); University Fellowships administered by the Graduate School (supplements Teaching Assistantships and Research Assistantships); and LSAMP Bridge to the Doctorate Fellowship. Current graduate students may also apply to the Clark School's Future Faculty Fellows Program; Dissertation Fellowship from the Graduate School; Litton Fellowship (ME & ECE); and other internally awarded and administered fellowships and scholarships. Assistance is also available in identifying and applying for prestigious external fellowships. ARCS Fellowship.

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Website: http://www.enme.umd.edu

Courses: ENME ENRE

Keywords: Design and Reliability of Systems (formerly known as Design, Risk Assessment and Manufacturing); Electronic Products and Systems; Mechanics and Materials; Thermal, Fluids and Energy Sciences

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations

The programs leading to the M.S. and Ph.D. degrees are open to qualified students holding a bachelor's degree in mechanical engineering. Admission may also be granted to students with degrees from other areas of engineering, mathematics, and physical sciences. In some cases, students may be required to take undergraduate courses to fill gaps in their background.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority for funding: 1 Dec / Final: 15 May	Preferred: 14 Oct / Final: 14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.enme.umd.edu

Requirements

- Mechanical Engineering, Doctor of Philosophy (Ph.D.) (p. 302)
- Mechanical Engineering, Master of Science (M.S.) (p. 301)

Facilities and Special Resources

The department and college of engineering provide access to a wide variety of experimental and computing facilities. Selected department computer resources include approximately 100 networked PC systems and 100 UNIX workstations. In addition, an enriched CAD computing environment is provided through a large number of third-party software products, including computer aided design applications.

Mechanical Engineering, Master of Science (M.S.)

Thesis only: 30 credits

Students enrolled in the M.S. program in Mechanical Engineering must complete at least 30 credits for graduation. This includes 24 credits of approved coursework and 6 credits of M.S. Thesis Research. The M.S. Coursework Plan sets forth the courses required to be taken by the student in partial fulfillment of the M.S. degree requirements. The coursework plan must be prepared in consultation with a faculty advisor in the student's technical area of interest, and submitted to the Graduate Office (2180 Glenn L. Martin Hall) for approval by the Director of Graduate Studies at the beginning of the first semester of study. Changes to the plan are permitted, but must be approved by the student's advisor and the Director of Graduate Studies prior to their implementation. A new coursework plan reflecting the changes must be filed with the ME Graduate Office every time changes are made.

Course	Title	Credits
Core Requirements		
Complete 24 hours of approved coursework [1]		24
ENME799	Master's Thesis Research	6
Specialization Requirements		
Select one of the following:		
Design and Reliability of Systems		
Electronic Products and Systems		
Thermal-Fluid Sciences		
Mechaniccs and Materials		
Total Credits		30

[1] At least 15 credits from courses taken at the 600 level or above.

Mechanical Engineering, Doctor of Philosophy (Ph.D.)

In addition, students must pass a qualifying examination, propose and have approved a Ph.D. dissertation topic (within two semesters of passing the qualifying exam), and successfully produce and defend a Ph.D. dissertation on an original research topic.

Students in the Ph.D. program must take a minimum of 36 credits of approved graduate coursework beyond the B.S. degree (a minimum of 12 credits of coursework at the University of Maryland) and 12 credits of dissertation research. Students currently holding an M.S. from an approved engineering, math, or science program may apply up to 24 credits from their previous degree towards their doctoral coursework requirement. In addition, students must pass a qualifying examination, propose and have approved a Ph.D. dissertation topic (within two semesters of passing the qualifying exam), and successfully produce and defend a Ph.D. dissertation on an original research topic.

(See http://www.enre.umd.edu/grad/phd-req.html for details)

Course	Title	Credits
Core Requirements		
Select a minimum of 36 credits of coursework beyond the Bachelor's degree [1]		36
Dissertation Research Requirements		
ENME899	Doctoral Dissertation Research	12
Total Credits		48

[1] The coursework plan should contain a minimum of six credits of courses in mathematics.

Mechanical Engineering (PMME)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered by the Department of Mechanical Engineering, our Mechanical degree programs give students the tools needed to expand their understanding of the fundamentals in this growing field while introducing them to modern technologies. Courses are taught by leaders in robotic control, advanced vehicle technologies, energy systems, and more, and students have access to state-of-the-art research facilities. Students in this program choose from 1 of 2 tracks: General Mechanical or Energy and the Environment.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/mechanical.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants

are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Mechanical Engineering, Master of Engineering (M.Eng.) (p. 303)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Mechanical Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Students choose one of the two focus areas and take five core courses and five electives from that area. Electives must be approved by their advisor.

Course	Title	Credits
Select five core courses and five electives from one of the following focus areas:		30
General Mechanical core course options:		
ENME600	Engineering Design Methods	
ENME605	Advanced Systems Control	
ENME607	Engineering Decision Making and Risk Management	
or ENRE671	Risk Assessment in Engineering	
ENME610	Engineering Optimization	
ENME631	Advanced Conduction and Radiation Heat Transfer	
ENME632	Advanced Convection Heat Transfer	
ENME640	Fundamentals of Fluid Mechanics	
ENME662	Linear Vibrations	
ENPM652	Applied Finite Element Methods	
ENPM671	Advanced Mechanics of Materials	
ENME690	Mechanical Fundamentals of Electronic Systems	
ENME712	Measurement, Instrumentation and Data Analysis for Thermo-Fluid Processes	
Energy and The Environment core course options:		
ENME647	Multiphase Flow and Heat Transfer	
ENPM621	Heat Pump and Refrigeration Systems Design Analysis	
ENPM622	Engergy Conversion I - Stationary Power	
ENPM623	Control of Combustion Generated Air Pollution	
ENPM624	Renewable Energy Applications	
ENPM625	Heating, Ventilation and Air Conditioning of Buildings	
ENPM626	Waste to Energy Conversion	
ENPM627	Environmental Risk Analysis	
ENPM635	Thermal Systems Design Analysis	
ENPM651	Heat Transfer for Modern Application	
ENPM654	Energy Systems Management	
ENPM656	Energy Conversion II -- Mobile Power	
Total Credits		30

Mechanical Engineering (Z061)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered by the Department of Mechanical Engineering, our Mechanical degree programs give students the tools needed to expand their understanding of the fundamentals in this growing field while introducing them to modern technologies. Courses are taught by leaders in robotic control, advanced vehicle technologies, energy systems, and more, and students have access to state-of-the-art research facilities. Students in this program choose from 1 of 2 tracks: General Mechanical or Energy and the Environment.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/mechanical.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Mechanical Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 304)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Mechanical Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Select one of the following four course sequences, or select any four of the following courses:		12
Energy and The Environment:		
Option 1:		
ENPM621	Heat Pump and Refrigeration Systems Design Analysis	
ENPM622	Engergy Conversion I - Stationary Power	
ENPM624	Renewable Energy Applications	
ENPM625	Heating, Ventilation and Air Conditioning of Buildings	
Option 2:		
ENPM622	Engergy Conversion I - Stationary Power	
ENPM623	Control of Combustion Generated Air Pollution	
ENPM624	Renewable Energy Applications	
ENPM627	Environmental Risk Analysis	
General Mechanical Engineering:		
Option 1:		
ENME631	Advanced Conduction and Radiation Heat Transfer	
ENME632	Advanced Convection Heat Transfer	
ENME633	Molecular Thermodynamics	
ENME640	Fundamentals of Fluid Mechanics	
Option 2:		
ENME600	Engineering Design Methods	
ENME610	Engineering Optimization	
ENPM671	Advanced Mechanics of Materials	

ENPM652	Applied Finite Element Methods	
Total Credits		12

Methods of Public Analysis (Z001)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Methods of Public Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 305)

Methods of Public Analysis, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

MSDE Administrator I Certification (Z052)

Graduate Certificate Program
College: Education

Abstract

This certification is cohort-based and is only open to internal candidates.

Website: http://www.education.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (1)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admission

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department website
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- MSDE Administrator I Certification, Post-Baccalaureate Certificate (P.B.C.) (p. 305)

MSDE Administrator I Certification, Post-Baccalaureate Certificate (P.B.C.)

Total Credits: 18 credits required

Course	Title	Credits
Required courses:		
EDUC640	Introduction to Educational Leadership	3
EDUC645	Leading Instructional Improvement	3
EDUC646	Leading Instructional Excellence	3
EDUC670	Learning Communities	3
EDUC671	Education Law, Finance and Policy	3
EDUC689	Practicum In Educational Administration and Supervision	3
Total Credits		18

Multimedia Journalism (Z071)

Graduate Certificate Program
College: Journalism

Abstract

The Graduate Certificate of Professional Studies in Multimedia Journalism teaches the skills most in demand today for communications professionals in news organizations, nonprofits and business. Multimedia Journalism blends practical training in digital storytelling with the critical application of editorial, ethical and legal principles.

Multimedia Journalism is designed for professional journalists and communicators to learn the skills and concepts needed for nonfiction storytelling across media platforms, including social and web. The program offers updated skills to professionals in a field in which technology is rapidly changing. Students learn to shoot and edit photos and video; create interactive, responsive web pages using html and css; report, write and upload stories from the field using mobile devices; and research and pitch ideas for new digital media businesses.

The 12-credit, four-course graduate certificate targets working professionals. Classes meet on Saturdays in the fall and spring semesters and may be taken one or two at a time.

If you are seeking a master's degree to provide you with the fundamentals of journalism for a professional career, please see the Journalism (JOMJ) (p. 266) degree. If you are an experienced journalist looking for a research-focused master's degree, go to Journalism (JOUR) (p. 268); If you're looking for a Ph.D. program, go to Journalism (JOST) (p. 267).

Contact

Office of Extended Studies
0132 Main Administration Building
7901 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7762
Email: oes@umd.edu
Website: http://ter.ps/oesjour

The Philip Merrill College of Journalism
Chris Harvey, Program Director
Serap Rada, Graduate Coordinator
Telephone: 301.405.2796
Email: charvey@umd.edu
Email: sdrada@umd.edu
Website: https://merrill.umd.edu/academics/multimedia-certificate/

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- CV/Resume

UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). For additional requirements, please see: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-certificate-multimedia-journalism/apply#International

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	30 Nov
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	1 Mar	28 Sep

Other Deadlines: Please visit the program website at http://ter.ps/oesjour

Requirements

- Multimedia Journalism, Post-Baccalaureate Certificate (P.B.C.) (p. 306)

Multimedia Journalism, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
JOUR623	Mobile Journalism	3
JOUR455	Media Entrepreneurship	3
JOUR604	Introduction to Multimedia Skills for Graduate Certificate Programs	3
JOUR652	Interactive Design and Development	3
Total Credits		12

Museum Scholarship & Material Culture (Z016)

Graduate Certificate Program
College: Arts and Humanities

Abstract

This certificate only accepts students currently enrolled in a University of Maryland graduate program

Website: http://www.history.umd.edu

Admissions

Please visit the department website.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.history.umd.edu

Requirements

- Museum Scholarship & Material Culture, Post-Baccalaureate Certificate (P.B.C.) (p. 307)

Museum Scholarship & Material Culture, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Select one of the following:		3
AMST655	Introduction to Museum Scholarship	
ANTH655	Introduction to Museum Scholarship	
HIST610	Introduction to Museum Scholarship	
Select one of the following:		3
AMST856	Museum Research Seminar	
ANTH856	Museum Research Seminar	
HIST810	Museum Research Seminar	
Select one of the following:		3
AMST857	Museum Scholarship Practicum	
ANTH857	Museum Scholarship Practicum	
HIST811	Museum Scholarship Practicum	
Additional course approved by advisor		3
Total Credits		12

Music Education (MUED)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Music offers programs of study leading to the Master of Arts degree with areas of specialization in ethnomusicology, music history and literature (musicology), music education, and music theory; the Master of Music degree with areas in performance, composition, conducting, and music education; the Doctor of Philosophy degree with areas of specialization in ethnomusicology, musicology, music education, and music theory; and the Doctor of Musical Arts degree with areas of specialization in composition, performance, and conducting.

Financial Assistance

A number of competitive fellowships, graduate assistantships, teaching assistantships, opera assistantships, and orchestral assistantships are available. Preference for financial assistance will be given to those who have filed an application for admission to the University and the School of Music Supplemental Application by December 1 (for performance programs) and January 15 (for Music Education only) and have been officially admitted.

Contact

Enrollment Services Coordinator
School of Music
2110 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5560
Fax: 301.314.9504
Email: musicadmissions@umd.edu

Jenny Lang, D.M.A.
Assistant Director for Admissions
School of Music
2110 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8435
Fax: 301.314.9504
Email: musicadmissions@umd.edu

Website: http://www.music.umd.edu

Courses: MUED MUET MUSC MUSP

Admissions
General Requirements

- Statement of Purpose and Letters of Recommendation: The statement of purpose and three letters of recommendation will be required to be uploaded in the Supplementary Application (Acceptd), not the Graduate School's application.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Graduate Record Examination (GRE): Ph.D. only
- CV/Resume
- Supplementary Application (https://app.getacceptd.com/umdmusic)

Admission to the graduate degree programs in music is highly selective. It is determined primarily by a performance audition, tapes and scores of original compositions, scholarly research papers, letters of recommendation, and/or successful teaching experience; additionally, in some academic areas, the general GRE scores are considered.
All non-native English-speaking students must achieve a score of 575/233/100 on the TOEFL to be invited for audition/admission (see the School of Music's admission website (http://www.music.umd.edu/prospective_students/application_materials/#international) for detailed English language requirements).

We require a passing TOEFL score (minimum 100 IBT, 233 CBT, 575 PBT) for all applicants whose primary language is not English before we will process your application or consider you for a live audition. The requirement will be waived for applicants who have earned an

undergraduate degree from an institution in the United States or another approved English-speaking country. Waivers will only be granted if at least three years of the undergraduate education or at least two years of the graduate education in a non-performance related field took place at an English-speaking institution. Graduate degrees in performance-related fields or performance certificates or diplomas will not exempt an applicant from submitting a passing TOEFL score.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.music.umd.edu

Requirements

- Music Education, Doctor of Philosophy (Ph.D.) (p. 309)
- Music Education, Master of Arts (M.A.) (p. 308)
- Music Education, Master of Music (M.Mus.) (p. 308)

Facilities and Special Resources

With approximately 300 public performances each year—including student recitals and more than thirty ensembles—School of Music students have robust performance opportunities The School of Music also hosts numerous guest clinicians each year and presents the Renegade Series, which brings to campus some of the most visionary artists in our field. As one of the nation's leading public research universities, the University of Maryland provides a wealth of opportunities to learn from and collaborate with scholars in a variety of disciplines. The School of Music makes its home in the Clarice Smith Performing Arts Center, which serves as an inter-disciplinary laboratory for the arts. The building's six performance halls, the Michelle Smith Performing Arts Library, specialized rehearsal rooms, and classrooms provide students with all the resources needed to become twenty-first century artist-citizens. The Clarice's presenting arm provides School of Music students with the opportunity to collaborate and learn from internationally recognized artists and scholars. Recent artists-in-residence have included the St. Lawrence String Quartet, the Cappella Pratensis, Etienne Charles, Tine Thing Helseth, Jeremy Denk, and Dawn Upshaw. The Michelle Smith Performing Arts Library (MSPAL) ranks among the top twenty university music libraries in the United States, and it offers a variety of archives, special collections, and other research resources that give it international stature among scholars in a broad spectrum of music disciplines. The total music collection includes approximately 50,000 books, 150,000 scores, 140,000 recordings, and 4,500 linear feet of archival materials. The International Piano Archives at Maryland (IPAM) is the only institutional collection in existence devoted to historic piano performance. IPAM contains 40,000 recordings, 8,500 music scores, 2,500 books, and a collection of reproducing pianos with 8,000 piano rolls. To date, IPAM has acquired the collections of more than 40 eminent pianists. The MSPAL Special Collections in Performing Arts embrace a growing number of national and international music organization archives representing music education, band history, solo and ensemble instrumental performance, music librarianship, and ethnomusicology. Materials in these archives include papers, music scores, recordings, books, magazines, photographs, and oral histories. MSPAL also features important archival and manuscript collections on music criticism and American music, the Charles Fowler Papers supporting the study of arts education, a significant Leopold Stokowski Collection, the Jacob Coopersmith Collection of Handeliana, the Radio Station WOR/Alfred Wallen stein Collection of 26,000 orchestral scores, and the performance parts of the Andre Kostelanetz Orchestra.

The surrounding DC-Baltimore region offers a host of community engagement opportunities. Our students can often be seen performing at major venues such as The John F. Kennedy Center for the Performing Arts, Strathmore Hall and the Phillips Collection. We also present at intimate community spaces such as Riversdale Mansion and the historical Greenbelt Theatre. Within a few miles of our home in College Park are research opportunities offered by Dumbarton Oaks, the Enoch Pratt Free Library of Baltimore, the Folger Shakespeare Library, the Library of Congress, the National Archives, the Smithsonian Institution, and many other specialized libraries.

Music Education, Master of Arts (M.A.)

Thesis only: 30 credits required

The Master of Arts Degree (Thesis Option in Ethnomusicology, Music Education, Music History and Literature [Musicology], or Music Theory; Non-Thesis Option in Ethnomusicology or Music History and Literature [Musicology]) requires a minimum of 30 credit hours (35 for Ethnomusicology), with a minimum of 12 credit hours in Major Studies, 9 credit hours in Studies in Areas Supporting the Major (14 for Ethnomusicology), and 9 credit hours in Other Studies in Music. In addition, a grade of B- or better is required in all courses used to fulfill requirements for the degree; a Thesis must be written (Ethnomusicology Non-Thesis Option requires two scholarly research papers), an oral defense of the Thesis (or research papers) must be passed; and a written comprehensive examination must be passed. Specific courses are required in each area of specialization.

Course	Title	Credits
Required courses:		
MUED690	Research Methods in Music and Music Education	3
MUED692	Foundations and Perspectives of Music Education	3
MUSC799	Master's Thesis Research	6
Studies in Areas Supporting the Major		9
Other Studies in Music		9
Total Credits		30

Music Education, Master of Music (M.Mus.)

Non-thesis only (scholarly paper required): 30 credits required

The Master of Music Degree (Non-Thesis Option in Composition, Conducting, Music Education, or Performance) requires a minimum of between 31 and 36 credit hours depending on the specific program.

Required coursework is distributed among three areas of study: Major studies, Studies in Areas Supporting the Major, and Other Studies in Music. In addition, a grade of B- or better is required in all courses used to fulfill requirements for the degree; a scholarly research paper must be written as part of MUSC648 or MUED690; a Final Project must be completed satisfactorily; and an oral comprehensive examination of courses required in Major Studies and in Studies in Areas Supporting the Major must be passed. Specific courses are required in each area of specialization.

Course	Title	Credits
Required courses:		
MUED690	Research Methods in Music and Music Education	3
MUED692	Foundations and Perspectives of Music Education	3
Additional 600-level MUED course		6
MUSC699	Selected Topics in Music	1-2
Studies in Areas Supporting the Major		9
Academic Courses in Music		9
Total Credits		31-32

Music Education, Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy degree requires the satisfactory completion of a significant body of coursework that, in the student's and Graduate Advisor's judgement, prepares the student for the preliminary examination that leads to admission to candidacy, as well as certain specific courses required in each area of specialization. A grade of B- or better is required in all courses used to fulfill requirements for the degree. A dissertation (whether written, or in project form) is required for all doctoral degrees in music. A Principal Advisor for the dissertation will be chosen by the student and the academic advisor; the Principal Advisor and the student will then nominate the remaining members of the dissertation committee. The student must submit a detailed Prospectus of the dissertation to the members of the dissertation committee and the Graduate Director, and must be admitted to candidacy prior to the approval of the dissertation committee by the Graduate School. The dissertation must be successfully defended before the entire dissertation committee. The Doctor of Philosophy degree requires a Written Dissertation.

The Ph.D. in Music Education requires a minimum of 48 credits beyond the master's degree, including 12 credits of MUED899.

Course	Title	Credits
Required courses:		
MUED780	Seminar in Music Teacher Education	3
MUED697	Curriculum & Assessment in Music Education	3
MUED790	Design and Analysis of Research in Music Education	3
MUED729	Doctoral Colloquium in Music Education	3
Additional 600-level MUED course		3
Music Academic Core		6
Quantitative Reasoning		3
Advanced Research Methods		6
Cognate Outside of Music		6
Dissertation Research Requirements		
MUED899		12
Total Credits		48

Music (MUSA)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Music offers programs of study leading to the Master of Arts degree with areas of specialization in ethnomusicology, music history and literature (musicology), music education, and music theory; the Master of Music degree with areas in performance, composition, conducting, and music education; the Doctor of Philosophy degree with areas of specialization in ethnomusicology, musicology, music education, and music theory; and the Doctor of Musical Arts degree with areas of specialization in composition, performance, and conducting.

Financial Assistance

A number of competitive fellowships, graduate assistantships, teaching assistantships, opera assistantships, and orchestral assistantships are available. Preference for financial assistance will be given to those who have filed an application for admission to the University and the School of Music Supplemental Application by December 1 (for performance programs) and January 15 (for Music Education only) and have been officially admitted.

Contact

Enrollment Services Coordinator
School of Music
2110 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5560
Fax: 301.314.9504
Email: musicadmissions@umd.edu

Jenny Lang, DMA
Assistant Director for Admissions
School of Music
2110 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8435
Fax: 301.314.9504
Email: musicadmissions@umd.edu

Website: http://www.music.umd.edu

Courses: MUED MUET MUSC MUSP

Admissions General Requirements

- Statement of Purpose and Letters of Recommendation: The statement of purpose and three letters of recommendation will be required to be uploaded in the Supplementary Application (Acceptd), not the Graduate School's application.

- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Graduate Record Examination (GRE)
- Supplementary Application (https://app.getacceptd.com/umdmusic)

Admission to the graduate degree programs in music is highly selective. It is determined primarily by a performance audition, tapes and scores of original compositions, scholarly research papers, letters of recommendation, and/or successful teaching experience; additionally, in some academic areas, the general GRE scores are considered. All non-native English-speaking students must achieve a score of 575/233/100 on the TOEFL to be invited for audition/admission (see the School of Music's admission website (http://www.music.umd.edu/prospective_students/application_materials/#international) for detailed English language requirements).

We require a passing TOEFL score (minimum 100 IBT, 233 CBT, 575 PBT) for all applicants whose primary language is not English before we will process your application or consider you for a live audition. The requirement will be waived for applicants who have earned an undergraduate degree from an institution in the United States or another approved English-speaking country. Waivers will only be granted if at least three years of the undergraduate education or at least two years of the graduate education in a non-performance related field took place at an English-speaking institution. Graduate degrees in performance-related fields or performance certificates or diplomas will not exempt an applicant from submitting a passing TOEFL score.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	1 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	1 Dec

Other Deadlines: Please visit the program website at http://www.music.umd.edu

Requirements

- Music, Doctor of Philosophy (Ph.D.) (p. 311)
- Music, Master of Arts (M.A.) (p. 310)

Facilities and Special Resources

With approximately 300 public performances each year—including student recitals and more than thirty ensembles—School of Music students have robust performance opportunities The School of Music also hosts numerous guest clinicians each year and presents the Renegade Series, which brings to campus some of the most visionary artists in our field. As one of the nation's leading public research universities, the University of Maryland provides a wealth of opportunities to learn from and collaborate with scholars in a variety of disciplines. The School of Music makes its home in the Clarice Smith Performing Arts Center, which serves as an inter-disciplinary laboratory for the arts. The building's six performance halls, the Michelle Smith Performing Arts Library, specialized rehearsal rooms, and classrooms provide students with all the resources needed to become twenty-first century artist-citizens. The Clarice's presenting arm provides School of Music students with the opportunity to collaborate and learn from internationally recognized artists and scholars. Recent artists-in-residence have included the St. Lawrence String Quartet, the Cappella Pratensis, Etienne Charles, Tine Thing Helseth, Jeremy Denk, and Dawn Upshaw. The Michelle Smith Performing Arts Library (MSPAL) ranks among the top twenty university music libraries in the United States, and it offers a variety of archives, special collections, and other research resources that give it international stature among scholars in a broad spectrum of music disciplines. The total music collection includes approximately 50,000 books, 150,000 scores, 140,000 recordings, and 4,500 linear feet of archival materials. The International Piano Archives at Maryland (IPAM) is the only institutional collection in existence devoted to historic piano performance. IPAM contains 40,000 recordings, 8,500 music scores, 2,500 books, and a collection of reproducing pianos with 8,000 piano rolls. To date, IPAM has acquired the collections of more than 40 eminent pianists. The MSPAL Special Collections in Performing Arts embrace a growing number of national and international music organization archives representing music education, band history, solo and ensemble instrumental performance, music librarianship, and ethnomusicology. Materials in these archives include papers, music scores, recordings, books, magazines, photographs, and oral histories. MSPAL also features important archival and manuscript collections on music criticism and American music, the Charles Fowler Papers supporting the study of arts education, a significant Leopold Stokowski Collection, the Jacob Coopersmith Collection of Handeliana, the Radio Station WOR/Alfred Wallen stein Collection of 26,000 orchestral scores, and the performance parts of the Andre Kostelanetz Orchestra.

The surrounding DC-Baltimore region offers a host of community engagement opportunities. Our students can often be seen performing at major venues such as The John F. Kennedy Center for the Performing Arts, Strathmore Hall and the Phillips Collection. We also present at intimate community spaces such as Riversdale Mansion and the historical Greenbelt Theatre. Within a few miles of our home in College Park are research opportunities offered by Dumbarton Oaks, the Enoch Pratt Free Library of Baltimore, the Folger Shakespeare Library, the Library of Congress, the National Archives, the Smithsonian Institution, and many other specialized libraries.

Music, Master of Arts (M.A.)

The Master of Arts Degree (Thesis Option in Music History and Literature [Musicology], or Music Theory; Non-Thesis Option in Music History and Literature [Musicology]) requires a minimum of 30 credit hours, with a minimum of 12 credit hours in Major Studies. In addition, a grade of B- or better is required in all courses used to fulfill requirements for the degree. Students must write an oral defense of the Thesis (or research papers) must be passed; and a written comprehensive examination must be passed. Specific courses are required in each area of specialization.

M.A. in Music History and Literature (Musicology) - Thesis or Non-thesis Option

Students in this option must have reading knowledge of one foreign language

Course	Title	Credits
Required courses:		
MUSC6xx	Seminars	9
MUSC646	Introduction to Musicology	3
MUSC6xx	Ethnomusicology course	3
MUSC electives		9
Thesis or Non-Thesis Requirements		6
Thesis:		
MUSC799	Master's Thesis Research	
Non-Thesis:		
MUSC6xx	Seminar	
Select an additional MUSC course		
Total Credits		30

M.A. in Music Theory (thesis option only)

Course	Title	Credits
Required courses:		
MUSC651	The Theories of Heinrich Schenker	3
MUSC661	Theory and Analysis of Atonal and Twelve-Tone Music	3
MUSC646	Introduction to Musicology	3
Music History course		3
Additional MUSC courses		9
Supportive Elective		3
MUSC799	Master's Thesis Research	6
Total Credits		30

Music, Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy degree requires the satisfactory completion of a significant body of coursework that, in the student's and Graduate Advisor's judgement, prepares the student for the preliminary examination that leads to admission to candidacy, as well as certain specific courses required in each area of specialization. A grade of B- or better is required in all courses used to fulfill requirements for the degree. A dissertation (whether written, or in project form) is required for all doctoral degrees in music. A Principal Advisor for the dissertation will be chosen by the student and the academic advisor; the Principal Advisor and the student will then nominate the remaining members of the dissertation committee. The student must submit a detailed Prospectus of the dissertation to the members of the dissertation committee and the Graduate Director, and must be admitted to candidacy prior to the approval of the dissertation committee by the Graduate School. The dissertation must be successfully defended before the entire dissertation committee. The Doctor of Philosophy degree requires a Written Dissertation.

Ph.D. in Musicology

Course	Title	Credits
Required courses:		
MUSC646	Introduction to Musicology	3
Ethnomusicology course		3
Remainder of coursework selected with Advisor		21
Pass a foreign language exam		
Dissertation Research Requirements		
MUSC899	Doctoral Dissertation Research	12
Total Credits		39

Ph.D. in Music Theory

Course	Title	Credits
Required courses:		
MUSC651	The Theories of Heinrich Schenker	3
MUSC661	Theory and Analysis of Atonal and Twelve-Tone Music	3
MUSC675	Music Theory Pedagogy	3
MUSC646	Introduction to Musicology	3
Music History course		3
Additional MUSC courses		9
Supportive Electives		4
Dissertation Research Requirements		
MUSC899	Doctoral Dissertation Research	12
Total Credits		40

Music (MUSC)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Music offers programs of study leading to the Master of Arts degree with areas of specialization in ethnomusicology, music history and literature (musicology), music education, and music theory; the Master of Music degree with areas in performance, composition, conducting, and music education; the Doctor of Philosophy degree with areas of specialization in ethnomusicology, musicology, music education, and music theory; and the Doctor of Musical Arts degree with areas of specialization in composition, performance, and conducting.

Financial Assistance

A number of competitive fellowships, graduate assistantships, teaching assistantships, opera assistantships, and orchestral assistantships are available. Preference for financial assistance will be given to those who have filed an application for admission to the University and the School of Music Supplemental Application by December 1 (for performance programs) and January 15 (for Music Education only) and have been officially admitted.

Contact

School of Music: The Academic Handbook is available online (http://www.music.umd.edu/current_students/handbooks) and provides descriptive information, details of course requirements, examination procedures, and graduation requirements for the M. A., M. M., D. M. A., and Ph. D. degree programs. International students should read the information contained in the International Applicants section of the Graduate Admission Application.

Enrollment Services Coordinator
School of Music
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Website: http://www.music.umd.edu

Courses: MUED MUET MUSC MUSP

Keywords: M.M.: Composition, Conducting, Music Education, and Performance. M.A.: Ethnomusicology, Music History & Literature, Music Theory, and Music Education. D.M.A.: Composition, Conducting, Performance, and Literature. Ph.D.: Ethnomusicology, Historical Musicology, and Music Theory. 7 Divisions: Voice/Opera, Strings, Piano, Winds & Percussion, Composition & Theory, Musicology, and Music Education.

Admissions

General Requirements

- Statement of Purpose and Letters of Recommendation: The statement of purpose and three letters of recommendation will be required to be uploaded in the Supplementary Application (Acceptd), not the Graduate School's application.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Supplementary Application (https://app.getacceptd.com/umdmusic)

Admission to the graduate degree programs in music is highly selective. It is determined primarily by a performance audition, tapes and scores of original compositions, scholarly research papers, letters of recommendation, and/or successful teaching experience; additionally, in some academic areas, the general GRE scores are considered.
All non-native English-speaking students must achieve a score of 575/233/100 on the TOEFL to be invited for audition/admission (see the School of Music's admission website (http://www.music.umd.edu/prospective_students/application_materials/#international) for detailed English language requirements).

We require a passing TOEFL score (minimum 100 IBT, 233 CBT, 575 PBT) for all applicants whose primary language is not English before we will process your application or consider you for a live audition. The requirement will be waived for applicants who have earned an undergraduate degree from an institution in the United States or another approved English-speaking country. Waivers will only be granted if at least three years of the undergraduate education took place at an English-speaking institution. Graduate degrees or performance certificates or diplomas will not exempt an applicant from submitting a passing TOEFL score. Please go here (http://www.music.umd.edu/prospective_students/application_materials/#international) for more specific information.

The School of Music will allow all graduate applicants whose overall TOEFL score is 90 or higher to audition, but in order to be considered for admission a fully passing TOEFL score must be submitted no later than February 15. Auditions will not be scheduled for applicants with an overall TOEFL score lower than 90.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	1 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	1 Dec

Other Deadlines: Please visit the program website at http://www.music.umd.edu

Requirements

- Music, Doctor of Musical Arts (D.M.A.) (p. 313)
- Music, Master of Music (M.Mus.) (p. 314)

Facilities and Special Resources

With approximately 300 public performances each year—including student recitals and more than thirty ensembles—School of Music students have robust performance opportunities The School of Music also hosts numerous guest clinicians each year and presents the Renegade Series, which brings to campus some of the most visionary artists in our field. As one of the nation's leading public research universities, the University of Maryland provides a wealth of opportunities to learn from and collaborate with scholars in a variety of disciplines. The School of Music makes its home in the Clarice Smith Performing Arts Center, which serves as an inter-disciplinary laboratory for the arts. The building's six performance halls, the Michelle Smith Performing Arts Library, specialized rehearsal rooms, and classrooms provide students with all the resources needed to become twenty-first century artist-citizens. The Clarice's presenting arm provides School of Music students with the opportunity to collaborate and learn from internationally recognized artists and scholars. Recent artists-in-residence have included the St. Lawrence String Quartet, the Cappella Pratensis, Etienne Charles, Tine Thing Helseth, Jeremy Denk, and Dawn Upshaw. The Michelle Smith Performing Arts Library (MSPAL) ranks among the top twenty university music libraries in the United States, and it offers a variety of archives, special collections, and other research resources that give it international stature among scholars in a broad spectrum of music disciplines. The total music collection includes approximately 50,000 books, 150,000 scores, 140,000 recordings, and 4,500 linear feet of archival materials. The International Piano Archives at Maryland (IPAM) is the only institutional collection in existence devoted to historic piano performance. IPAM contains 40,000 recordings, 8,500 music scores, 2,500 books, and a collection of reproducing pianos with 8,000 piano rolls. To date, IPAM has acquired the collections of more than 40 eminent

pianists. The MSPAL Special Collections in Performing Arts embrace a growing number of national and international music organization archives representing music education, band history, solo and ensemble instrumental performance, music librarianship, and ethnomusicology. Materials in these archives include papers, music scores, recordings, books, magazines, photographs, and oral histories. MSPAL also features important archival and manuscript collections on music criticism and American music, the Charles Fowler Papers supporting the study of arts education, a significant Leopold Stokowski Collection, the Jacob Coopersmith Collection of Handeliana, the Radio Station WOR/Alfred Wallen stein Collection of 26,000 orchestral scores, and the performance parts of the Andre Kostelanetz Orchestra.

The surrounding DC-Baltimore region offers a host of community engagement opportunities. Our students can often be seen performing at major venues such as The John F. Kennedy Center for the Performing Arts, Strathmore Hall and the Phillips Collection. We also present at intimate community spaces such as Riversdale Mansion and the historical Greenbelt Theatre. Within a few miles of our home in College Park are research opportunities offered by Dumbarton Oaks, the Enoch Pratt Free Library of Baltimore, the Folger Shakespeare Library, the Library of Congress, the National Archives, the Smithsonian Institution, and many other specialized libraries.

Music, Doctor of Musical Arts (D.M.A.)

The Doctor of Musical Arts degree requires the satisfactory completion of a significant body of coursework that, in the student's and Graduate Advisor's judgement, prepares the student for the preliminary examination that leads to admission to candidacy, as well as certain specific courses required in each area of specialization. A grade of B- or better is required in all courses used to fulfill requirements for the degree. A dissertation (whether written, or in project form) is required for all doctoral degrees in music. A principal advisor for the dissertation will be chosen by the student and the academic advisor; the principal advisor and the student will then nominate the remaining members of the dissertation committee. The student must submit a detailed prospectus of the dissertation to the members of the dissertation committee and the graduate director, and must be admitted to candidacy prior to the approval of the dissertation committee by the Graduate School. The dissertation must be successfully defended before the entire dissertation committee. The Doctor of Musical Arts degree requires a Written Dissertation, a Recording Project, a Performance Project, or a Musical Composition. Some Doctoral of Musical Arts degrees have an option of a Written Dissertation or a Performance Dissertation.

D.M.A. in Composition

Non-course requirements for composition students include a pre-candidacy scholarly paper and a recital presentation of original music composed while in the degree program at Maryland. The recital presentation must take place prior to the defense of the dissertation project.

Course	Title	Credits
MUSP719	Interpretation and Repertoire (MUSP719T - Lessons)	8
Studies in Areas Supporting the Major [1]		15
Other course in Music [2]		5
Dissertation Research Requirements		
MUSP899	Doctoral Dissertation Research	12
Total Credits		40

1 Including MUSC675

2 Including MUSC648

D.M.A. in Conducting

Non-course requirements for conducting students include proficiencies in diction, voice, and piano. Students must also submit a pre-candidacy paper.

Choral Conducting Specialization

Course	Title	Credits
Performance, Principal Medium		12
Performance-Related Courses		15
Academic Courses in Music [1]		9
Dissertation Research Requirements		
MUSP899	Doctoral Dissertation Research	6
MUSP899	Doctoral Dissertation Research	6
Total Credits		48

1 Including MUSC648

Orchestral Conducting Specialization

Course	Title	Credits
Performance, Principal Medium		14
Performance-Related Courses		15
Academic Courses in Music [1]		9
Dissertation Research Requirements		
MUSP899	Doctoral Dissertation Research	6
MUSP899	Doctoral Dissertation Research	6
Total Credits		50

1 Including MUSC648

Wind Conducting Specialization

Course	Title	Credits
Performance, Principal Medium		14
Performance-Related Courses		15
Academic Courses in Music [1]		9
Dissertation Research Requirements		
MUSP899	Doctoral Dissertation Research	6
MUSP899	Doctoral Dissertation Research	6
Total Credits		50

1 Including MUSC648

D.M.A. in Performance

Course	Title	Credits
Performance, Principal Medium [1]		10-14
Performance-Related Courses [1]		12-20
Academic Courses in Music [2]		9-12
Specialization Requirements		
Select one of the following specializations:		12
Piano Solo:		

Select a written dissertation or a performance dissertation	
Collaborative Piano:	
Select a written dissertation or a performance dissertation	
Strings:	
Select a written dissertation or a performance dissertation	
Winds and Percussion:	
Select a written dissertation or a performance dissertation	
Voice and Voice Opera:	
MUSP899	Doctoral Dissertation Research
Voice Pedagogy:	
MUSP899	Doctoral Dissertation Research
MUSC899	Doctoral Dissertation Research
Total Credits	43-58

1 Credits may vary for the following specializations: Piano Solo, Collaborative Piano, Strings, Voice, Voice Pedagogy, Voice Opera, Winds and Percussion.

2 Including MUSC648

Music, Master of Music (M.Mus.)

The Master of Music Degree (Non-Thesis Option in Composition, Conducting, Music Education, or Performance) requires a minimum of between 31 and 36 credit hours depending on the specific program. Required coursework is distributed among three areas of study: Major studies, Studies in Areas Supporting the Major, and Other Studies in Music. In addition, a grade of B- or better is required in all courses used to fulfill requirements for the degree; a scholarly research paper must be written as part of MUSC648 or MUED690; a Final Project must be completed satisfactorily; and an oral comprehensive examination of courses required in Major Studies and in Studies in Areas Supporting the Major must be passed. Specific courses are required in each area of specialization.

M.M. in Composition

(minimum of 30 credits beyond the Bachelor's degree)

Course	Title	Credits
Core Requirements		
Major Studies in Music		10
Studies in Areas Supporting the Major		15
Other Courses in Music		6
Scholarly paper		
Total Credits		31

M.M. in Conducting

(minimum of 30 credits beyond the Bachelor's degree)

Course	Title	Credits
Specialization Requirements		
Select one of the following:		32-34
Choral Conducting specialization:		
Major Studies in Music (10 credits minimum)		
Studies in Areas Supporting the Major (15 credits minimum)		
Academic Courses in Music (9 credits minimum) [1]		
Scholarly paper		
Instrumental Conducting specialization:		
Major Studies in Music (10 credits minimum)		
Studies in Areas Supporting the Major (13-14 credits minimum)		
Advanced Courses in Music (9 credits minimum) [1]		
Scholarly paper		
Total Credits		32-34

1 Including MUSC648

M.M. in Performance

(minimum of 30 credits beyond the Bachelor's degree)

Course	Title	Credits
Core Requirements		
Major Studies in Music (10 credits minimum)		10
Studies in Areas Supporting the Major (credits may vary per specialization)		12-17
Academic Courses in Music (9 credits minimum) [1]		9
Specialization Requirements		
Select one of the following:		
Jazz		
Piano Solo		
Collaborative Piano		
Strings		
Voice [1]		
Opera [2]		
Winds		
Percussion		
Total Credits		31-36

1 The M.M. in Voice (Solo) requires one year (or its equivalent) of college level German, plus one year of either French or Italian.

2 The M.M. in Opera requires one year (or its equivalent) of college level Italian, plus one year of either French or German and a piano proficiency exam.

National Security Studies (Z003)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- National Security Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 315)

National Security Studies, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Networking Software Development (Z119)

Graduate Certificate Program
College: Engineering

ABSTRACT

The aim of the Graduate Certificate in Networking Software Development is to encourage the students to acquire specialized knowledge and skills in the technical areas of networking and software development. We have positioned this Certificate to expose the students to both computer networking and software development, which will allow them to go through a well-balanced coursework in excess of the Master's degree requirements. While completing the certificate program, students will also acquire/develop additional practical problem-solving, programming and analytical skills. Typical industry positions our students take after graduation that would benefit from this Certificate include: software engineer or software quality engineer (for a networking device vendor such as Cisco or a cloud service provider such as Amazon), system engineer, or cloud engineer.

CONTACT

Master's in Telecommunications Program Office
2433 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu

Admissions

The Certificate in Computing Systems is only available to current Telecommunication students.

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	N/A	N/A

Requirements

- Networking Software Development, Post-Baccalaureate Certificate (P.B.C.) (p. 315)

Networking Software Development, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
At least two of the following courses:		6
ENTS689	Special Topics in Telecommunications (ENTS689A - Algorithms and Data Structures)	
ENTS669	Special Topics in Computing (ENTS669X - Special Topics in Networking)	
At least two of the following courses:		6
ENTS689	Special Topics in Telecommunications (ENTS689G - Design and Analysis of Communication Networks)	
ENTS649	Special Topics in Networking (ENTS649X - Special Topics in Networking)	
ENTS749	Advanced Topics in Networking (ENTS749X - Advanced Topics in Networking)	
Total Credits		12

Neuroscience and Cognitive Sciences (Z037)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Neuroscience and Cognitive Science (NACS) Program offers a Post-Baccalaureate Certificate for students pursuing graduate degrees in related departmental programs. This certificate program allows students to obtain significant interdisciplinary training that complements their graduate degree in a NACS-related discipline. The NACS Certificate serves to acknowledge this training.

Contact

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Assistant Director
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College Park, MD 20742
Telephone: 301.405.8910
Email: pkomarek@umd.edu

Website: http://www.nacs.umd.edu

Admissions

Only students enrolled in a Ph.D. degree program at the University of Maryland, College Park will be eligible for the NACS Certificate. Students enrolled in the NACS Ph.D. program are not eligible. Interested students are encouraged to contact the NACS office for advisement on coordinating the NACS Certificate requirements with their Ph.D. requirements. Admission will be at the discretion of the NACS Graduate Director, with the advice and consent of the NACS Executive Committee. Students must submit a letter to the NACS Graduate Director requesting admission to the Certificate Program and outlining their plan of study for the NACS Certificate. Students must also identify a NACS faculty member to serve as their Certificate advisor. In many cases this may be the student's existing departmental Ph.D. advisor. Study for the Certificate must be completed by the end of the fifth year after admission to the program.

1. Completed application to the NACS Certificate program.
2. PDF copy of unofficial UM transcript.
3. Letter from primary advisor endorsing the application to the NACS Certificate program.

All files should be submitted electronically, with a strong preference for PDF files. Please use transparent file names that start with your name, i.e., smith_application.pdf, smith_transcript.pdf, smith_endorsement.pdf. Send files together in **one** email message to Pam Komarek, NACS Assistant Director, at pkomarek@umd.edu.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department's website	Please visit the department's website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department's website	Please visit the department's website

Other Deadlines: Please visit the program website at http://www.nacs.umd.edu

Requirements

- Neuroscience and Cognitive Sciences, Post-Baccalaureate Certificate (P.B.C.) (p. 316)

Neuroscience and Cognitive Sciences, Post-Baccalaureate Certificate (P.B.C.)

16 credits required

Students must complete the following courses with a grade of B (3.0) or better in each class.

1. Students must complete a core of 10 credits, in addition to their Ph.D. course requirements, comprising at least two of the courses within the NACS core curriculum (NACS641, NACS642, NACS643, NACS644, NACS645, all 4 credit courses) and two semesters of NACS608, one credit per semester.
2. Students must complete at least 6 additional credits from graduate courses approved by the NACS program. The student's NACS advisor and the NACS Graduate Director must approve the courses taken to fulfill these credits. Courses taken at the 400-level require the approval of the NACS Graduate Director.

Course	Title	Credits
NACS608	Neuroscience and Cognitive Science Seminar [1]	2
Select 6 credits of Electives approved by advisor		6
Select two of the following:		8
NACS641	Introduction to Neurosciences	
NACS642	Cognitive Neuroscience	
NACS643	Computational Neuroscience	
NACS644	Cellular and Molecular Neuroscience	
NACS645	Cognitive Science	
Total Credits		16

[1] 1 credit per semester, 2 credits total.

Neurosciences and Cognitive Science (NACS)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The NACS program offers a wide range of research and training opportunities for students who are interested in pursuing doctoral-level research in a variety of areas within neuroscience and cognitive science. Faculty research interests center around seven main areas: Cellular & Molecular, Sensory & Motor Systems, Computational Modeling & Theory, Language & Speech, Cognition & Emotion, Development & Aging, and Disorders & Treatment. Research approaches include both the theoretical and experimental, with several laboratories doing both. Research and training activities of NACS take place within the laboratories of faculty in 23 participating departments and units: Aerospace Engineering, Animal and Avian Sciences, Behavioral and Community Health, Bioengineering, Biology, Computer Science, Electrical and Computer Engineering, English, Entomology, Epidemiology & Biostatistics, Hearing and Speech Sciences, Human Development, Kinesiology, Linguistics, Nutrition and Food Science, Philosophy, Psychology, and Teaching and Learning, Policy and Leadership, as well as the Center for Advanced Study of Language, the Institute for Advanced Computer Studies, the Institute for Systems Research, the Maryland Neuroimaging Center, and the Second Language Acquisition program. The NACS program requires the completion of two required core courses and three out of five core courses, including introduction to neurosciences, cognitive neuroscience, computational neuroscience, cellular and molecular neuroscience, and cognitive science. The goal of the Program is to bring together the diverse perspectives and strengths of all the included disciplines in order to understand the working of the nervous system, the mind, and behavior. For more information, please visit our website: http://www.nacs.umd.edu.

Financial Assistance

Fellowships are available on a competitive basis to both entering and continuing students, while qualified students may also receive teaching

assistantships. In addition, some faculty have research assistantships for their students.

Contact

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Website: http://www.nacs.umd.edu

Courses : NACS

Keywords: Interdisciplinary program combining Neuroscience, Cognitive Science, Computational Science and other disciplines related to studies of brain function.

Admissions

General Requirements

- Statement of Purpose: The statement of purpose and three letters of recommendation will be required to be uploaded in the Supplementary Application (Acceptd), not the Graduate School's application.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	1 Nov
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	1 Nov

Other Deadlines: Please visit the program website at http://www.nacs.umd.edu

Requirements

- Neurosciences and Cognitive Science, Doctor of Philosophy (Ph.D.) (p. 318)
- Neurosciences and Cognitive Science, Master of Science (M.S.) (p. 317)

Facilities and Special Resources

The Program, by virtue of its breadth, has access to the facilities of all the departments, institutes, and centers of its faculty members. These include the Institute for Systems Research, the Institute for Advanced Computer Studies, the Center for Advanced Study of Language, the Maryland Neuroimaging Center, and the various well-equipped research laboratories and department facilities of the faculty. Animal facilities are available where necessary. NACS has developed close collaborations with the National Institutes of Health (NIH), Children's National Medical Center (CNMC), and Walter Reed National Military Medical Center (WRNMMC). NACS students can conduct research in laboratories with NACS adjunct faculty at these institutions. Thus, these relationships extend research and training opportunities for students while they get their degrees from the NACS program.

Neurosciences and Cognitive Science, Master of Science (M.S.)

Thesis option: 31 credits required
Non-thesis option: 31 credits required

Please note, students are not directly admitted into the master's program. The M.S. in NACS is awarded en route to the Ph.D.

Course	Title	Credits
NACS600	Ethics in Scientific Research	2
NACS640	Foundational Readings Seminar	2
Select 12 credits of Electives		12
Select three courses, with at least one in each area:		9
Cognitive Area:		

NACS642	Cognitive Neuroscience	
NACS645	Cognitive Science	
Neuroscience Area:		
NACS641	Introduction to Neurosciences	
NACS643	Computational Neuroscience	
NACS644	Cellular and Molecular Neuroscience	
Thesis or Non-Thesis Requirements		6
Thesis:		
NACS799	Master's Thesis Research	
Non-Thesis:		
NACS798	Master's Non-Thesis Research	
Total Credits		31

Neurosciences and Cognitive Science, Doctor of Philosophy (Ph.D.)

Specific requirements include two core courses--a scientific ethics course and a foundational readings course--and three out of five core courses from among introduction to neuroscience, cognitive neuroscience, computational neuroscience, cellular and molecular neuroscience, and cognitive science. A qualifying examination is given at the beginning of the third year to ensure that all students have a core knowledge of basic neuroscience and cognitive science and know how to apply it to their own research area, and that each student has the knowledge and skills necessary to develop a dissertation proposal. By the end of their fourth year, students formally present their dissertation proposal and are admitted to candidacy. The dissertation is normally completed within one year of the proposal defense, and within five years of entering the program.

Doctoral students are required to complete 37 credits, including 12 credits of NACS899. Non-course requirements include completing a First Year Research Project, pass the Qualifying Axam, submit a Dissertation Proposal, and pass the Ph.D. Defense.

Course	Title	Credits
NACS600	Ethics in Scientific Research	2
NACS640	Foundational Readings Seminar	2
Select 9 credits of Supplemental Courses		9
Select three courses, with at least one in each area:		12
Cognitive Area:		
NACS642	Cognitive Neuroscience	
NACS645	Cognitive Science	
Neuroscience Area:		
NACS641	Introduction to Neurosciences	
NACS643	Computational Neuroscience	
NACS644	Cellular and Molecular Neuroscience	
Dissertation Research Requirements		
NACS899	Doctoral Dissertation Research	12
Total Credits		37

Nonprofit Management and Leadership (Z116)

Graduate Certificate Program

College: Public Policy

Abstract

The Nonprofit Management and Leadership Certificate is a four-course (twelve-credit) graduate certificate program that is designed to provide invaluable skills and experiences to enable students to delve deeply into the complex challenges facing nonprofit leaders. The certificate will equip students to be able to formulate innovative strategies, negotiate the complexities of global philanthropy and NGO leadership, develop entrepreneurial skills, engage in major international issues in the developing world, employ their skills to advance the work of nonprofit organizations, and make a significant difference around the globe.

contact

Office of Student Affairs
School of Public Policy
2101 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://publicpolicy.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program Specific Requirements

- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Original: 26 July / Extended to: 17 Aug	17 Jan
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	N/A	N/A

Other Deadlines: Please visit the program website at http://publicpolicy.umd.edu

Requirements

- Nonprofit Management and Leadership, Post-Baccalaureate Certificate (P.B.C.) (p. 319)

Nonprofit Management and Leadership, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
PUAF789	(PUAF789Y - Nonprofit and NGO Management and Leadership)	3
PUAF688	Topics in Public Policy (PUAF688F - Nonprofit Financial Management)	3
Select two of the following:		6
PUAF689	Public Policy Topics (PUAF689Y - Theory, Practice, and New Paradigms in Nonprofit Fundraising)	
PUAF689	Public Policy Topics (PUAF689Z - Strategic Management for Nonprofit and Public Organizations)	
PUAF689	Public Policy Topics (PUAF689P - Strategic Philanthropy)	
PUAF688	Topics in Public Policy (PUAF688O - China's Dynamic Philanthropic and Social Sector Landsc)	
Total Credits		12

Nuclear Engineering (ENNU)

Graduate Degree Program
College: Engineering

Abstract

This program is not currently accepting students. Please visit our graduate program listing (https://academiccatalog.umd.edu/graduate/programs) for information on other programs.

Website: http://www.nuclear.umd.edu

Admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.nuclear.umd.edu

Requirements

- Nuclear Engineering, Doctor of Philosophy (Ph.D.) (p. 319)
- Nuclear Engineering, Master of Science (M.S.) (p. 319)

Nuclear Engineering, Master of Science (M.S.)

This program is not currently accepting applications.

Nuclear Engineering, Doctor of Philosophy (Ph.D.)

This program is not currently accepting applications.

Nuclear Engineering (online) (MENU)

Graduate Degree Program
College: Engineering

Abstract

This program is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.oaee.umd.edu

Admissions

This program is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oaee.umd.edu

Requirements

- Nuclear Engineering, Master of Engineering (M.Eng.) (p. 320)

Facilities and Special Resources

Courses in the Professional Master of Engineering program are currently offered on the College Park campus, at off-campus centers via video-teleconferencing, and 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, the University Center of Northeastern Maryland in Harford County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture

dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Nuclear Engineering, Master of Engineering (M.Eng.)

This program is not currently accepting applications.

Nuclear Engineering (online) (Z050)

Graduate Certificate Program
College: Engineering

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.oaee.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oaee.umd.edu

Requirements

- Nuclear Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 320)

Nuclear Engineering, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Nuclear Engineering (PMNU)

Graduate Degree Program
College: Engineering

This program is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.oaee.umd.edu

Admissions

This program is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oaee.umd.edu

Requirements

- Nuclear Engineering, Master of Engineering (M.Eng.) (p. 320)

Nuclear Engineering, Master of Engineering (M.Eng.)

This program is not currently accepting applications.

Nuclear Engineering (Z062)

Graduate Certificate Program
College: Engineering

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.oaee.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oaee.umd.edu

Requirements

- Nuclear Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 321)

Nuclear Engineering, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Nutrition and Food Science (NFSC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Graduate Program in Nutrition and Food Science is an interdisciplinary and interdepartmental program administered by the Department of Nutrition and Food Science (NFSC). The program draws upon faculty and scientists from numerous schools, departments, and organizations. These include the Departments of Animal and Avian Sciences, Anthropology, Cell Biology and Molecular Genetics, Chemistry and Biochemistry, Nutrition and Food Science, and Plant Science and Landscape Architecture; the School of Public Health; and nearby research institutions. The Director of the Graduate Program in Nutrition and Food Science is selected from amongst faculty to administer the program.

The program offers graduate study leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Nutrition and Food Science with specialization in either Nutrition or Food Science. All programs require completion of a research project (thesis or dissertation). Programs of research are individually planned with the student, an advisor and an appropriate Graduate Advisory Committee. Research interests of faculty members specializing in Nutrition include the genetic and metabolic basis for dietary requirements of animals and humans, nutritional biochemistry, nutritional aspects of chronic disease, international nutrition, community nutrition, epidemiology, neuroscience, health behavior and health promotion. Research interests of faculty members specializing in Food Science include food chemistry, food processing and engineering, food microbiology, food safety, food nanotechnology, food toxicology, public policy, risk assessment and functional and nutraceutical foods.

Financial Assistance

Financial support for graduate students is available on a competitive basis. The Department of Nutrition and Food Science offers a number of graduate teaching assistantships that support students in the program. A limited number of research assistantships are also available. Applications for teaching assistantships for the fall semester are due around mid-February for continuing students. New students who are interested in a teaching position should contact their advisor for information. International students who wish to be considered for a teaching assistantship and are not native speakers of English are required by the university to take part in the International Teaching Assistant (ITA) evaluation prior to the start of classes. This includes taking the Test of Spoken English (TSE) and submitting official test scores. International teaching assistants who may have been educated entirely in English and those with a bachelor's and/or master's degree from universities in English-speaking countries must also be evaluated. Decisions regarding teaching assistantships are usually reached by April 1. Graduate teaching assistants receive a stipend plus health insurance. Tuition fees (up to 10 credits per semester) for teaching assistants are waived by the university. Programs in Biochemistry, Chemistry, and Cellular Biology and Molecular Genetics, administered in the corresponding departments, also offer teaching assistantships to qualified students in the Graduate Program in Nutrition and Food Science. Students are encouraged to submit teaching assistantship applications to those programs. A limited number of research assistantships are available from grant funds, with the student assisting in the research supported under the grant. The research often may be applicable to the thesis or dissertation. The tuition for graduate research assistants is charged at the in-state rate and often is paid directly by the supporting grant. In addition, research assistants receive health insurance. Research assistantships generally are not awarded until after students have attended classes and are known to faculty. Additional types of financial aid are available, including a work-study program, grants, fellowships and loans. For more information regarding financial support, please refer to the Graduate School website at www.gradschool.umd.edu.

Contact

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Email: akp@umd.edu

Website: http://www.nfsc.umd.edu

Relationships: Animal Sciences (ANSC) (p. 36) **Neurosciences and Cognitive Science (NACS)** (p. 315)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Dec	29 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Dec	29 Sep

Other Deadlines: Please visit the program website at http://www.nfsc.umd.edu

Requirements

- Nutrition and Food Science, Doctor of Philosophy (Ph.D.) (p. 322)
- Nutrition and Food Science, Master of Science (M.S.) (p. 322)

Facilities and Special Resources

The Graduate Program office is housed within the Department of Nutrition and Food Science in Room 0112 in the Skinner Building.

Program facilities are located in the Departments of Nutrition and Food Science, Animal and Avian Sciences, Anthropology, Cell Biology and Molecular Genetics, Chemistry and Biochemistry, and Plant Science and Landscape Architecture. There are also collaborative arrangements with the National Institutes of Health (NIH), Food and Drug Administration (FDA), and U.S. Department of Agriculture (USDA). Additionally, opportunities exist for collaborative research with scientists at the FDA through the Joint Institute for Food Safety and Applied Nutrition.

Library facilities and resources are extensive. In addition to campus libraries, the National Archives, the National Agricultural Library, the Library of Congress, and the National Library of Medicine are all within 10 miles of campus and are available to students.

Nutrition and Food Science, Master of Science (M.S.)

Thesis only: 30 credits

Requirements for the M.S. degree in Nutrition and Food Science are a minimum of 30 graduate credits of course work including a minimum of 12 credits of 600 level courses and a minimum of 6 graduate credits of masters thesis research (NFSC799). A minimum GPA of 3.0 is required to maintain good academic progress for graduation. The student must complete a thesis and successfully defend their research before a graduate faculty advisory committee approved by the Graduate School. An average duration of a Master's project is 2-3 years depending upon prior education and experience.

Course	Title	Credits
Required courses:		
NFSC688	Seminar in Nutrition and Food Science	2
NFSC799	Master's Thesis Research	6
Select one graduate level statistics course		3
Specialization Requirements		
Select one of the following options:		19
Nutrition (NUTR)		
Food Science (FDSC)		
Total Credits		30

Nutrition and Food Science, Doctor of Philosophy (Ph.D.)

Requirements for the Ph.D. degree in Nutrition and Food Science include a mastery of the broad fundamentals of area of specialty, as well as the demonstrated ability to conduct independent research. Course requirements include: a minimum of 27 graduate credits of coursework including 9 credits of advanced nutrition/food science courses, beyond the M.S. degree and 12 credits of NFSC899. A minimum GPA of 3.0 is required to maintain good academic progress for graduation. Students are admitted to full candidacy for the Ph.D. upon passing a comprehensive exam on basic core knowledge of area of specialty and submittal of a research proposal. In addition the student must prepare and successfully defend a dissertation before their graduate faculty advisory committee. The average duration of a Ph.D. degree program is 4-5 years, depending upon prior education and experience.

Course	Title	Credits
NFSC688	Seminar in Nutrition and Food Science	3
Statistics course at the 600-level or higher		3
Remainder of coursework		9
Dissertation Research Requirements		
NFSC899	Doctoral Dissertation Research	12
Total Credits		27

Organic and Sustainable Agriculture (Z090)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Contact

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Marcia Shofner
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Website: http://oes-entm.umd.edu/

Relationships: Applied Entomology (MPAE) (p. 46) **Beekeeping (Z088)** (p. 67) **Integrated Pest Management (Z089)** (p. 259) **Organic and Sustainable Agriculture (Z090)** (p. 322) **Urban Agriculture (Z091)** (p. 421)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (1)
- Strong background in biology

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	N/A

Other Deadlines: Please visit the program website at http://oes-entm.umd.edu/

Requirements

- Organic and Sustainable Agriculture, Post-Baccalaureate Certificate (P.B.C.) (p. 323)

Organic and Sustainable Agriculture, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

In this 12-credit certificate, students learn about sustainability through examining both the ecosystem services provided by beneficial insects, as well as the management of injurious insects.

Course	Title	Credits
Required courses:		
ENTM710	Insect Biodiversity, Physiology and Ecology	3
ENTM735	Sustainability	3
ENTM730	Plant Diagnostics	3
ENTM740	Organic Practices	3
Total Credits		12

Performance (MFAP)

Graduate Degree Program
College: Arts and Humanities

Abstract

The three-year M.F.A. in Performance will offer admission once every three years to experienced performers. This unique world-class graduate program offers an array of studies and opportunities designed to explore the broad spectrum of American and International performance traditions while laying the foundation for individual ground-breaking approaches to personalized expression and teaching skills. We are looking for motivated visionaries with unique voices who would appreciate a performance-based graduate program designed to guide and support them on their journey from idea to revelation, from exploration to ownership. Currently the M.F.A. in Performance program is not accepting applications.

Financial Assistance

The School of Theatre, Dance, and Performance Studies is housed in the Clarice Smith Performing Arts Center at Maryland. This state-of-the-art facility includes the 650-seat Ina and Jack Kay Theatre, the 200-seat Robert and Arlene Kogod Theatre and the 100-seat Cafritz Theatre.

The campus is within a few miles of the John F. Kennedy Center for the Performing Arts, Arena Stage, the National Theatre, Ford's Theatre, The Shakespeare Theatre at the Lansburgh, and the Olney Theatre Center, which are among more than 80 professional area theatres. Two of the greatest libraries in the world, the Library of Congress and the Folger Shakespeare Library, are in close proximity to campus. Students also make regular use of the Smithsonian Institution, the Federal Theatre Project Archives, the National Archives, and more than 50 specialized libraries and institutions in the Washington metropolitan area.

Website: tdps.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample: A sample of work, uploaded to the Upload Requirements section of the application.
- Teaching Resume: Entered in the Employment History section of the application.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not Accepting Applicants for Fall 2018
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrant	Not Accepting Applicants for Fall 2018

Other Deadlines: Please visit the program website at http://www.tdps.umd.edu

Requirements

- Performance, Master of Fine Arts (M.F.A.) (p. 324)

Facilities and Special Resources

The School of Theatre, Dance, and Performance Studies is housed in the Clarice Smith Performing Arts Center at Maryland. This state-of-the-art facility includes the 650-seat Ina and Jack Kay Theatre, the 200-seat Robert and Arlene Kogod Theatre and the 100-seat Cafritz Theatre.

The campus is within a few miles of the John F. Kennedy Center for the Performing Arts, Arena Stage, the National Theatre, Ford's Theatre, The Shakespeare Theatre at the Lansburgh, and the Olney Theatre Center, which are among more than 80 professional area theatres. Two of the greatest libraries in the world, the Library of Congress and the Folger Shakespeare Library, are in close proximity to campus. Students also make regular use of the Smithsonian Institution, the Federal Theatre Project Archives, the National Archives, and more than 50 specialized libraries and institutions in the Washington metropolitan area.

Performance, Master of Fine Arts (M.F.A.)

M.F.A. in Performance applicants must provide CV; One page statement of goals in relation to your creative and research interests; teaching resume; video of introduction and creative work; and three letters of recommendation from professional directors, teachers or artistic collaborators. Callbacks are held in February.

The MFA in Performance is currently on hiatus. Please contact the School of Theatre, Dance, and Performance Studies regarding future recruitment.

Philosophy (PHIL)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of Philosophy offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees with emphasis on contemporary Anglo-American philosophy and the interaction of philosophy with other disciplines. Students often enter the doctorate program without an M.A. degree, but the M.A. may be earned on the way to the Ph.D. While the Ph.D. program is suitable primarily for students who wish to enter a career in teaching and research at the college or university level, the M.A. program is appropriate for those who want to deepen and expand the knowledge they gained as undergraduates or who wish to develop competence in philosophy to apply to some other professional field.

Financial Assistance

The Department administers a number of graduate assistantships and fellowships. Virtually all applicants admitted to the doctoral program are offered support, typically a combination of teaching assistantships and fellowships.

Contact

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Website: http://www.philosophy.umd.edu

Courses: PHIL

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- Writing Sample

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Jan
International Applicants	

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.philosophy.umd.edu

Requirements

- Philosophy, Doctor of Philosophy (Ph.D.) (p. 325)
- Philosophy, Master of Arts (M.A.) (p. 325)

Facilities and Special Resources

A number of other departments and programs at the University offer graduate students additional opportunities for coursework and research.

In addition to the excellent libraries on campus, students may use other libraries in the Washington/Baltimore metropolitan area, such as the Library of Congress, the Center for Hellenic Studies, and the Eisenhower Library on the campus of Johns Hopkins University.

The Department sponsors a series of colloquia by visiting and local speakers throughout the academic year.

Philosophy, Master of Arts (M.A.)

Non-thesis only: 30 credits required

Students must complete ten three-hour courses, or a total of thirty hours of course work. Two of these courses must be Core Courses, the remaining eight graduate seminars offered by the Department. Additional details may be found in the Graduate Handbook on the Department's www site: http://www.philosophy.umd.edu.

Course	Title	Credits
Required courses:		
PHIL660	Metaphysics, Mind, and Language	3
PHIL640	Value Theory	3
Select remainder of coursework		24
Fulfill a Logic Requirement		
Complete a Scholarly paper		
Total Credits		30

Philosophy, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 36 credits in addition to 12 credits of PHIL899. Students are also required to complete a History requirement and a Logic requirement which does not count towards the total course or credit total. For the Prospectus Requirement, students must form a Prospectus Examining Committee, write a Dissertation Prospectus, and have the Prospectus approved by the Prospectus Examining Committee at a formal Prospectus Meeting. In addition all students who have completed the coursework component of the program are required to audit at least one course in each semester thereafter.

Students who seek admission to the Ph.D. program normally should intend to pursue only full-time study toward that degree.

In addition to the Graduate School requirements, students must complete twelve three-hour courses, or a total of thirty-six hours of course work. Two of these courses must be Core Courses, the remaining ten graduate seminars offered by the Department. Additional details may be found in the Graduate Handbook on the Department's www site. Foreign language skills are required only as demanded by the individual student's research.

Partial credit toward the Ph.D. requirements may be awarded for relevant work done at other graduate institutions. The Director of Graduate Studies will make a specific determination in each case.

Course	Title	Credits
Required courses:		
PHIL660	Metaphysics, Mind, and Language	3
PHIL640	Value Theory	3
Select one course in the Philosophy of Science		3
Select remainder of coursework		27
Dissertation Research Requirements		
PHIL899	Doctoral Dissertation Research	12
Total Credits		48

Physical Activity (PHAC)

Graduate Degree Program
College: Public Health

Abstract

The Master of Public Health (MPH) degree with a concentration in Physical Activity is a 43-credit professional degree, administered by the Department of Kinesiology. All MPH students with a concentration in Physical Activity will complete five public health core courses, eight courses in the physical activity and related cognate area, an internship, and a capstone project.

Contact

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MPH Coordinator
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Courses: KNES

Admissions

Students may qualify for admission with a 3.0 GPA, strong GREs [50th percentile as minimums in the Verbal and Quantitative sections (approximately 150 in each section); 4.0 minimum in Analytical Writing], and a minimum of three strong recommendations from people knowledgeable about the applicant's prior academic achievements and research potential. Applicants will submit a focused letter detailing academic and career goals relevant to the degree program. Appropriate background course work closely aligned with the intended degree specialization is expected.

Admission Application for MPH in Physical Activity

How to Apply: MPH applications should be submitted through the Schools of Public Health Application Service, SOPHAS, at www.SOPHAS.org (http://www.SOPHAS.org). The application cycle opens in SOPHAS typically in September, and all application documents must be submitted via SOPHAS. Remember to designate the University of Maryland School of Public Health, College Park, as one of your school choices along with your desired program. The University of Maryland School of Public Health GRE Code in SOPHAS is 0485.

SOPHAS will verify the information reported and send it electronically to the University of Maryland School of Public Health once complete. The verification process can take 4-6 weeks to complete. We do not accept materials outside of the SOPHAS process. The University of Maryland requires a Supplemental Application and a Supplemental Application Fee of $75 for each program.

The application deadline for the MPH program is March 1. Applications are accepted for fall semester matriculation only (so spring semester admissions).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 14 Dec / Final: 12 Apr	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority: 14 Dec / Final: 15 Feb	N/A

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Physical Activity, Master of Public Health (M.P.H.) (p. 326)

Facilities and Special Resources

The Department of Kinesiology has three areas of specialization: Cognitive Motor Neuroscience, Exercise Physiology, and Physical Cultural Studies. Laboratories are maintained, which support original investigations in each of the three areas. Laboratories include equipment for measuring metabolic parameters, strength, body composition, postural sway, ground reaction forces, amount of physical activity in daily life, as well as muscle biopsies and movement analysis. The response of the human body to physical activity/exercise can be viewed through ECG, EEG, EMG and systematic behavior observation systems. Each of the three research areas has interfaced computer hardware and software to support data collection and analysis. Collaborations with the School of Medicine at the Baltimore campus and with NIH often result in the availability of other facilities and equipment. All graduate students have access to computers and other forms of technology. Details and pictures of current facilities and equipment are available at our website: www.sph.umd.edu/KNES/.

Physical Activity, Master of Public Health (M.P.H.)

Non-thesis only (capstone project required): 45 credits

The Master of Public Health (MPH) degree with a concentration in Physical Activity is a 45-credit professional degree, administered by the Department of Kinesiology.

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
KNES600	Kinesiology in Public Health	3
KNES601	Epidemiology of Physical Activity	3
KNES602	Physical Activity Program Planning and Evaluation	3
Research Methods course:		3
EPIB710	Grantsmanship for Epidemiologic Research	
or FMSC780	Qualitative Methods in Family and Health Research	
or HLTH625	Community Assessment through Qualitative Methods	
or HLTH710	Methods and Techniques of Research	
or KNES610	Methods and Techniques of Research	
Electives		12
KNES778	Internship in Physical Activity and Public Health	4
KNES786	Capstone Project in Physical Activity and Public Health	3
Total Credits		45

Physics (PHYS)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

A fuller picture of the Department of Physics can be found on the department's home page, http://umdphysics.umd.edu; only a summary is provided here. The Department of Physics offers graduate courses on general and specialized topics in advanced physics, and has active research programs in many areas of current interest. The various research groups can be browsed at http://umdphysics.umd.edu/research/research-areas.html.

Financial Assistance

The Department offers both teaching and research assistantships. Combined with fellowships in some cases, virtually all Ph.D. students have full financial support for the duration of their graduate studies. In a typical semester, approximately 50 teaching assistants and 160 research assistants work in the Department, while some others are supported by nearby government and industry facilities at which they are doing their

research. Summer research stipends for advanced graduate students are customary, and a few summer teaching assistantships are available.

Contact

Graduate Admissions
Department of Physics
1309 John S Toll Physics Building
4150 Campus Drive
The University of Maryland
College Park, MD 20742
Telephone: 301.405.5982
Email: grad@physics.umd.edu

Website: http://www.umdphysics.umd.edu

Courses: PHYS

Relationships: Biophysics (BIPH) (p. 83) **Chemical Physics (CHPH)** (p. 115)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- GRE Subject (Physics)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationphys.pdf)
- Publications/Presentations: If authors exceed 30 leave field blank.

The University of Maryland Department of Physics has a strong national and international reputation, and receives a large number of applications each year from well-qualified students. Consequently, admission to the graduate degree program is quite selective.

Students who enter the graduate program are normally expected to have strong backgrounds in physics, including intermediate-level courses in mechanics, electricity and magnetism, physical optics, quantum physics, and thermodynamics. Prior research experience and strong letters of recommendation are highly valued. Good preparation in mathematics is also desirable, especially for students who may pursue theoretical physics research.
For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	14 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	14 Dec

Other Deadlines: Please visit the program website at http://www.umdphysics.umd.edu

Requirements

- Physics, Doctor of Philosophy (Ph.D.) (p. 328)
- Physics, Master of Science (M.S.) (p. 327)

Facilities and Special Resources

Current research in the Department spans an immense range of theoretical and experimental work on the forefront of knowledge, far too large to describe here. Details of current research in the various fields, faculty, and facilities involved can be found at the Departmental web site, http://umdphysics.umd.edu.

There are close academic ties with the Institute for Physical Science and Technology on the campus; members of the Institute supervise graduate research and also teach physics courses. Faculty members in the departments of Astronomy and Electrical & Computer Engineering also frequently direct thesis research.

The University of Maryland is located within the metropolitan area of Washington, D.C., where it enjoys the proximity of a large number of outstanding institutions, such as NASA's Goddard Space Flight Center, the Naval Research Laboratory, the National Institute of Standards and Technology, the Johns Hopkins Applied Physics Laboratory, the Department of Energy, the National Institutes of Health, the Library of Congress, and other federal institutions. The Department works closely with certain research groups at some of these institutions, and a significant fraction of graduate students do their primary research at off-campus facilities, co-directed by a member of the graduate faculty in the Department. In order to facilitate graduate study in the Washington area, the Department of Physics also has adjunct professors from certain government laboratories.

Physics, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly report): 30 credits

The Department offers both thesis and non-thesis options in its Master of Science program. However, virtually all students are admitted directly to the Ph.D. program, and obtain a Master's naturally in the course of their Ph.D. studies. A student interested instead in a terminal Master's degree should consult with the physics department. The Departmental requirements for the non-thesis option include: a total of 30 credits excluding research credits; at least four courses of the general physics sequence; a paper as evidence of ability to organize and present a written scholarly report on contemporary research; and the passing at the master's level of one section of the Ph.D. qualifying exam. The thesis option's requirements include at least four courses of the general physics sequence, a graduate laboratory unless specially exempted, and the passing of an oral examination including a defense of thesis.

Course	Title	Credits
Core Requirements		30
Four courses in the general physics sequence		
Thesis or Non-Thesis Option		

Thesis:		
PHYS799	Master's Thesis Research	
Pass an oral examination		
Non-Thesis:		
Complete a scholarly report		
Pass at the master's level one section of the Ph.D. qualifying exam		
Total Credits		30

Physics, Doctor of Philosophy (Ph.D.)

The requirements for the Doctor of Philosophy degree in physics are set in general terms to allow the individual student as much freedom as possible to prepare a course of study suited to individual needs. These requirements are: competence in standard topics of graduate-level physics indicated by a satisfactory performance on a qualifying examination; attendance in a departmental research seminar; the giving of an oral Preliminary Research Presentation demonstrating the ability to organize and orally present a topic of current research interest in physics; a paper showing the student's ability to organize and present a written scholarly report on contemporary research prior to candidacy; advanced course study outside the student's field of specialization consisting of two advanced courses (six credits), at least one of which must be a physics course at the 700 level or above; PHYS624 or PHYS625 for students with theoretical theses; and research competence through active participation in at least two hours of seminar, 12 hours of thesis research, and the presentation and defense of an original dissertation.

Course	Title	Credits
PHYS624	Advanced Quantum Mechanics [1]	3
or PHYS625	Non-relativistic Quantum Mechanics	
Select two courses (700 or 800 level) outside of specialization		
Non-credit Foundations and Frontiers of Physics seminar		
Select two semesters of a physics seminar course		
Pass the qualifying exam		
Give a Preliminary Research presentation after passing the qualifying exam		
Submit a scholarly paper		
Dissertation Research Requirements		
PHYS899	Doctoral Dissertation Research	12
Total Credits		15

[1] Theory students only

Plant Science (PLSC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Plant Science (PLSC) graduate program offers training with concentrations in Agronomy, Cell Biology, Functional Genomics, Molecular Physiology, Conservation Biology and Ecology, Pathology, and Landscape Ecosystems Management. Students are trained by graduate faculty with an emphasis on interdisciplinary education and mastery of their chosen area of study. All PLSC graduate training is thesis-based, and an emphasis is placed on research and discovery learning rather than coursework. Students work directly with internationally-recognized graduate faculty who are leaders in their disciplines. Students are guided in their studies by a major professor as well as a graduate advisory committee selected by the student from experts on the campus, nearby research institutions, and other universities. The program offers Master of Science and Doctor of Philosophy degrees. Tuition, fees, and stipends of Ph. D students are generally supported by extramural funding or by the department through teaching or graduate research assistantships. M.S. students can be extramurally or self-funded. The objectives of the Plant Science graduate program are: - To provide students with the skills in analyzing and interpreting quantitative and qualitative information; using inductive and deductive reasoning; and communicating in both verbal and written form. - To train a next generation of plant science researchers to lead public and private efforts to provide a secure and nutritious food supply, maintain and restore ecosystems, and provide high quality plant science education. - To advance knowledge in plant sciences that is critical to the improvement of the efficiency, profitability and sustainability of global and national agricultural and natural resources. The Plant Science graduate program seeks to maximize the close association of the many national laboratories (USDA, FDA, NASA, NIST, NIH, DOE, etc.) with have cooperative agreements with the department and the University of Maryland. As a result, graduates of the program are particularly well trained for employment in public and private sector research positions.

Financial Assistance

A limited number of research assistantships and teaching assistantships are available for qualified applicants. There is strong competition for these awards, and candidates are encouraged to submit their applications as early as possible in the semester preceding anticipated enrollment in the Department.

Contact

Jianhua Zhu, PhD
PLSC Graduate Program Chair
Department of Plant Science and Landscape Architecture
2130 Plant Sciences Building
4291 Fieldhouse Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.0920
Fax: 301.314.9308
Email: jhzhu@umd.edu

Website: http://www.psla.umd.edu

Courses: PLSC

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations

- Description of Research
- Faculty of Interest

Admission to the program requires a baccalaureate from an accredited college or university in the United States or the equivalent in a foreign country. Applicants are expected to have a 3.0 cumulative grade point average (4.0 scale) in all previous academic work. All applicants must submit Graduate Record Examination (GRE) scores and an acceptable combined score of 300 on the verbal and quantitative portions of the GRE are desirable.

Equipment and expertise for next generation sequencing, laser scanning confocal, life science imaging, bioinformatics, genomics, proteomics, and metabolomics are available either in the department or on campus. Extensive controlled-environment facilities, including state-of-the-art growth chambers and a large and modern greenhouse complex are complemented by a large network of field research facilities located strategically across the state representing various environments with different climates and soil types. Students have access to computer labs and shared processing arrays and a comprehensive computer center located on campus.

The University Libraries on campus and both the National Agriculture Library and Library of Congress located nearby make the library resources accessible to students among the best in the nation. Many of the Departments projects are conducted in cooperation with other departments on campus and with professionals at the Food and Drug Administration facility near the campus and the headquarters of the USDA Agricultural Research Service located three miles from campus in Beltsville. Scientists at the Geologic Survey, the National Academy of Sciences, NASA, National Institutes of Health, Department of Energy, Smithsonian, and National Park Service, as well as other agencies, have cooperated with the Departments faculty on various projects. Scientists from some of these agencies have adjunct appointments in the Department, have taught special courses at the University, and participate on graduate committees.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	11 Jan	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	11 Jan	28 Sep

Other Deadlines: Please visit the program website at http://www.psla.umd.edu

Requirements

- Plant Science, Doctor of Philosophy (Ph.D.) (p. 330)
- Plant Science, Master of Science (M.S.) (p. 329)

Facilities and Special Resources

State-of- the-art facilities for conducting research in plant science are located at the College Park campus in the Plant Science Building and Research Greenhouse Complex. Modern laboratories are equipped for genomic, molecular genetic, cell biological, physiological, and biochemical research in plant science. Equipment and expertise for next generation sequencing, life science imaging, bioinformatics, genomics, proteomics, and metabolomics are available either in the department or on campus. Extensive controlled-environment facilities, including state-of-the-art growth chambers and a large and modern greenhouse complex are complemented by a large network of field research facilities located strategically across the state representing various environments with different climates and soil types. Students have access to computer labs and shared processing arrays and a comprehensive computer center located on campus. The University Libraries on campus and both the National Agriculture Library and Library of Congress located nearby make the library resources accessible to students among the best in the nation. Many of the Department's projects are conducted in cooperation with other departments on campus and with professionals at the Food and Drug Administration facility near the campus and the headquarters of the USDA Agricultural Research Service located three miles from campus in Beltsville. Scientists at the Geologic Survey, the National Academy of Sciences, NASA, National Institutes of Health, Department of Energy, Smithsonian, and National Park Service, as well as other agencies, have cooperated with the Department's faculty on various projects. Scientists from some of these agencies have adjunct appointments in the Department, have taught special courses at the University, and participate on graduate committees.

Plant Science, Master of Science (M.S.)

Thesis only: 30 credits

A program of study approved by the Advisor must be completed prior to the second semester of enrollment. This plan must be filed with the Graduate Director. The program requires a minimum of 30 semester hours of course work beyond the B.S. degree, including 6 hours of thesis research credits (799). A minimum of 12 credit hours must be earned in course-work at the 600 level or higher. Students are also required to complete one semester hour of PLSC618 and one semester hour of PLSC619. Students must also complete one semester each of 400-level (or higher) biochemistry, plant physiology, and statistics which may be completed as part of a B.S. or M.S. degree program.

A thesis must be submitted to the Graduate School. This thesis is approved by the Thesis Examining Committee appointed by the Dean of the Graduate School upon the recommendation of the student's advisor. The advisor serves as the chairperson of the examining committee and the student's advisory committee typically serves as members of the examining committee. Committee membership must comply with Graduate School requirements for membership. The submitted thesis must comply with the University of Maryland Thesis and Dissertation Style Guide.

It is the responsibility of the Advisor and Student to ensure that all University Research Assurances are followed. Research involving human subjects must be approved in advance by the Institutional Review Board (IRB). Research involving the use of vertebrate animals must be approved in advance by the Animal Care and Use Committee. Research using hazardous materials (chemical or biological), recombinant RNA/DNA must be approved in advance by the appropriate University committee

Course	Title	Credits
Core Requirements		
PLSC608	Research Methods	2

PLSC618	Advances in Research; Critiquing Primary Plant Science Literature	1
PLSC619	Seminars in Plant Science and Landscape Architecture	1
PLSC799	Master's Thesis Research	6
Additional coursework		20
Total Credits		30

Plant Science, Doctor of Philosophy (Ph.D.)

A program of study approved by the Advisor must be completed by the end of the third semester of enrollment. This plan must be filed with the Graduate Director. The Graduate School requires that every student seeking the Ph.D. satisfactorily complete a minimum of 12 semester hours of dissertation credits (899). Students are also required to complete one semester hour of PLSC618 and one semester hour of PLSC619. Students are also required to complete 2 semester hours of PLSC608. In addition students admitted to the PhD program that lack the MS degree must complete the course requirements of the MS degree (24 credit hours of coursework). Students must also complete one semester each of 400-level (or higher) biochemistry, plant physiology, and statistics which may be completed as part of a B.S. or M.S. degree program and an additional graduate level course in biochemistry or statistics.

An oral qualifying examination must be completed satisfactorily before a student is admitted to candidacy. At the discretion of the advisor and advisory/examining committee a written exam may also be conducted. The examination must be attempted by the end of the fifth semester of study. Under extenuating circumstances and with written permission of the Program Director, this time frame may be extended. The examining committee corresponds to the student's Advisory committee. To be eligible to take the candidacy examination, the student must have submitted a research proposal that has been approved by the student's advisor and Advisory Committee prior to the formal qualifying examination. The completed proposal must be given to the committee at least two weeks before the scheduled date for the qualifying examination. The qualifying examination focuses principally on the written proposal. However, the student's mastery of general knowledge of Plant Science may also be examined. At the end of the examination, all members of the committee vote on the student's performance. Two negative votes constitute failure. Upon successful completion of the examination, the committee recommends to the Director that the student by admitted to candidacy based on satisfactory performance during the examination. It is the responsibility of the student to submit an application for admission to candidacy when all the requirements for candidacy have been fulfilled. Students failing the qualifying examination may be re-examined once within 6 months of the first examination date. Students may be re-examined only once. Failure to pass the qualifying examination a second time will result in termination of the student's program.

A dissertation based on independent, original research must be submitted to the Program and the Graduate School. This dissertation is approved by the Dissertation Examining Committee appointed by the Dean of the Graduate School upon the recommendation of the student's advisor. The advisor serves as the chairperson of the examining committee and the student's advisory committee typically serves as members of the examining committee. Committee membership must comply with Graduate School requirements for membership. The submitted dissertation must comply with the University of Maryland Thesis and Dissertation Style Guide.

It is the responsibility of the Advisor and Student to ensure that all University Research Assurances are followed. Research involving human subjects must be approved in advance by the Institutional Review Board (IRB). Research involving the use of vertebrate animals must be approved in advance by the Animal Care and Use Committee. Research using hazardous materials (chemical or biological), recombinant RNA/DNA must be approved in advance by the appropriate University committee

Course	Title	Credits
Required courses:		
PLSC608	Research Methods	2
PLSC618	Advances in Research; Critiquing Primary Plant Science Literature	1
PLSC619	Seminars in Plant Science and Landscape Architecture	1
Select one of the following:		16-24
	Doctoral students without an M.S. degree in Plant Science or closely related discipline are required to complete 24 credits of coursework	
	Doctoral students with an M.S. degree in Plant Science or closely related discipline are required to complete 16 credits of coursework	
Dissertation Research Requirements		
PLSC899	Doctoral Dissertation Research	12
Total Credits		32-40

Policy Studies (POSI)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, international development, international security and economic policy, social policy, non-profit management, public management and leadership, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research. The Ph.D. program trains policy analysts who will make their marks in the practice and teaching of public policy. To this end, a limited number of applicants are admitted annually. In their first year, students develop and demonstrate proficiency in economic, normative, political, and quantitative analysis. They then

pursue advanced study within their chosen specialization. Finally, they complete and defend a doctoral dissertation. Those awarded the degree move on to public policy careers in government, research, academia, and the private sector.

Financial Assistance

The School has financial aid available in the form of fellowships, graduate assistantships, and employment. All qualified applicants meeting appropriate deadlines are considered.

Contact

Office of Student Affairs
2101 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Courses: PLCY

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)
- Description of Research: Describe the research areas you are interested in, the research problem(s) on which you would like to work, and their relevance / significance.(uploaded to the Uploads Requirements section of the application)
- Writing Sample: The writing sample should be relatively recent, and should preferably demonstrate the applicant's ability to structure and analyze a problem, or critique/develop a viewpoint. (uploaded to the Uploads Requirements section of the application)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Preferred: 15 Dec / Final: 15 Mar
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	Preferred: 15 Dec / Final: 15 Mar

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Policy Studies, Doctor of Philosophy (Ph.D.) (p. 331)

Policy Studies, Doctor of Philosophy (Ph.D.)

All students are required to choose an advisor within their first year.

The Ph.D. in Policy Studies program enables students to develop in-depth knowledge of the field and to conduct cutting-edge research on public policy and management issues. Students are required to complete at least 24 credits of appropriate coursework, including two required research methods courses. In addition, students must take 12 credits of dissertation research. Students are required to pass exams in the basic disciplines of public policy and two field exams, usually with both a written and oral component, in broad topics relevant to their proposed thesis topics. They then develop and defend a dissertation prospectus followed by the dissertation itself.

The Ph.D. in Policy Studies is principally directed at students who have a master's degree in public policy or a related field, such as economics, statistics, education or international relations, from a program comparable in quality and content to one of the School's own master's programs. Students may apply while in the final year of such a program. Applications will also be considered from recent college graduates without a master's degree who have an outstanding academic record.

Most students will be required to maintain full-time status through completion of the course work leading up to their exams and thesis proposal; this typically requires two to three years. Some students will be admitted on a part-time basis with an agreed schedule to ensure timely completion. A faculty member at the School must agree to serve as the Ph.D. applicant's academic sponsor at the time of admission into the program. To facilitate the selection of a sponsor, applicants should include, as part of their application, a description of the general areas in which they want to study and write their dissertation.

Course	Title	Credits
Core Requirements		
Complete 24 credits including the following:		24
PLCY798	Readings in Public Policy (PLCY 798R)	
PLCY798	Readings in Public Policy (PLCY 798Z)	
Dissertation Research Requirements		
PLCY899	Doctoral Dissertation Research	12
Total Credits		36

Population Studies (Z036)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The Certificate Program in Population Studies provides interdisciplinary training in demographic methods, theory, and research for graduate students in departments affiliated with the Maryland Population Research Center (MPRC), culminating in a Certificate in Population Studies for graduate students who complete the required coursework. Historically, the Population Sciences were born out of the discipline of Demography, a field that boomed during the 1950s around fears of a world-wide population explosion and its consequences. Demography was taught largely within departments of Sociology. Today the field has changed a great deal and researchers worry about issues of low fertility and underpopulation as much as overpopulation. What demographers of the 1950s missed in their dire predictions were unprecedented behavioral changes of families to changing economic circumstances, changing social pressures, and changing ideas of what constituted a family. Today, the core of the population sciences is not forecasting population growth and its components (mortality, fertility and immigration) but instead understanding what economic, social, and ideational factors affect these components and how changing mortality, fertility, and immigration may affect other family choices. With the growing emphasis on choice and on the consequences of population change, and with the shift from being a field focusing on forecasting to one focusing on understanding causal relationships, training across several fields of study has become necessary.

Contact

Joan Kahn, Ph.D.
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3137 Parren J Mitchell Art-Sociology Building
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College Park, MD 20742
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Judith Hellerstein, Ph.D.
Professor of Economics
Department of Economics
3115J Tydings Hall
7343 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3545
Email: hellerst@umd.edu

Website: http://www.popcenter.umd.edu

Admissions

The Certificate Program is offered to students enrolled in a Ph.D. program at the University of Maryland College Park. Please contact your department for more information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.popcenter.umd.edu

Requirements

- Population Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 332)

Facilities and Special Resources

The Maryland Population Research Center (MPRC) is a multidisciplinary center dedicated to the support and advancement of population research. We provide a research environment conducive to interdisciplinary collaboration among our diverse Faculty Associates and to the development of young scholars through cross-disciplinary training and mentoring. Our proximity to Washington DC allows us to develop strong relationships with the U.S. federal statistical agencies and with policy communities. These ties provide our researchers access to under-utilized or restricted-use government data, allow them to partner with agencies on research and data improvement projects, and allow them to provide policy makers with non-partisan, scientific evidence on population-related issues. MPRC provides workspace, a fully-equipped computer lab, a laptop loaner program, SAS and Stata training courses, and administrative and financial support to associated graduate students.

Population Studies, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

The Certificate requires a minimum of four courses (12 credits) including two required core courses and two electives. At least one course taken for the Certificate must be from a department other than the student's home unit. (See the Certificate information page on the MPRC website (http://www.popcenter.umd.edu/resources/scholar-dev/demography-cert/certificate) for details.) Students must achieve a GPA of 3.0 or higher in these four courses. Previously earned credits may be retroactively applied toward the Certificate. Students may apply to participate in the Certificate Program at any time up until the semester before they intend to graduate. Applications may be accessed by following the link above.

Course	Title	Credits
SOCY611	Introduction to Demographic Methods	3
SOCY630	Population and Society	3
or ECON772	Population Economics	
Select two electives approved by advisor		6
Total Credits		12

Principles of Public Health (Z076)

Graduate Certificate Program
College: Public Health

Abstract

The University of Maryland School of Public Health offers a post-baccalaureate Certificate in Principles of Public Health administered by the Department of Health Services Administration. This online 15 credit,

five-course program is designed to provide working professionals with a foundation in the core principles of public health including

1. Foundations of Epidemiology
2. Introduction to Health Systems
3. Biostatistics
4. Foundations of Environmental Health
5. Health Behavior

The exceptional foundation in the Principles of Public Health will raise your career trajectory, increasing your

- Marketable expertise
- Professional flexibility and mobility
- Core public health competencies
- Career advancement readiness

You do not have to take leave time from work and can complete the certificate program in as little as eight months. You will benefit from the flexibility and accessibility of online courses that fit in with your personal and professional responsibilities. Easy to use web-based technology enables you to learn in an engaging, interactive environment. Intensive advising/mentoring enhances your learning experience.

Instruction is delivered by University of Maryland School of Public Health faculty and experts from prominent public health organizations. The University of Maryland School of Public Health is accredited by the Council on Education for Public Health.

Contact

Negin Fouladi
Program Director
Department of Health Services Administration
3310 School of Public Health Building
4200 Valley Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2438
Email: fouladi@umd.edu

Website: http://sph.umd.edu/department/hlsa/certificate-principles-public-health

Relationships: Public Health Practice and Policy (PHPP) (p. 343)

Admissions

General Program and Admission Information for the Graduate Certificate in Principles of Public Health can be found on the Office of Extended Studies (https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-public-health-practice) website.

UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). Additional Requirements can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-public-health-practice/apply and here: http://globalmaryland.umd.edu/offices/international-students-scholar-services/graduate-admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website

Other Deadlines: Please visit the program website at http://sph.umd.edu/department/hlsa/certificate-principles-public-health

Requirements

- Principles of Public Health, Post-Baccalaureate Certificate (P.B.C.) (p. 333)

Principles of Public Health, Post-Baccalaureate Certificate (P.B.C.)

14 credits required

The Graduate Certificate in Principles of Public Health (GC-PPH) provides working professionals with a rigorous, multi-disciplinary foundation in the five core areas of public health, advancing understanding of the science of public health.

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
Total Credits		14

Professional Communication for Enhanced English Fluency (online) (Z106)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The **Graduate Certificate of Professional Studies in Professional Communication for Enhanced English Fluency** (EEF) provides specialized instruction in professional speaking (voice, diction, pronunciation), professional writing (style, grammar), speaking and writing across professional communication contexts (e.g., business, health, law, politics, science), and professional speech writing. Students also advance their

critical thinking and vocabulary skills through courses focused on the rhetorical analyses of public texts (e.g., debates, laws, speeches, judicial decisions), which will deepen students' knowledge of rhetoric and political culture nationally and internationally. Those enrolling in Z106 will take classes online.

Contact

Shawn J. Parry-Giles, Ph.D.
Professor and Chair
Department Communications
2130 Skinner Building
4300 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6527
Email: spg@umd.edu

Website: http://eef.umd.edu

Courses: COMM

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105andz106.pdf)
- Admissions Exams

***Visa Eligibility:** Z106 is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	16 May
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	13 Mar

Other Deadlines: Please visit the program website at http://eef.umd.edu

Requirements

- Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.) (p. 334)

Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Required courses:		
COMM618	Professional Communication: Rhetoric & Style	3
COMM638	Professional Communication: Rhetoric & Voice	3
COMM708	Professional Communication: Rhetoric and Context	3
COMM655	Seminar in Speechwriting	3
Select two of the following:		6
COMM601	Historical-Critical Research in Communication	
COMM604	Argumentation Theory	
COMM670	Seminar in Listening Behavior	
COMM748	The Rhetoric of the Presidency	
COMM760	Seminar in Political Communication	
COMM768	Seminar in Public Address	
Total Credits		18

Professional Communication for Enhanced English Fluency (Z105)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The **Graduate Certificate of Professional Studies in Professional Communication for Enhanced English Fluency** (EEF) provides specialized instruction in professional speaking (voice, diction, pronunciation), professional writing (style, grammar), speaking and writing across professional communication contexts (e.g., business, health, law, politics, science), and professional speech writing. Students also advance their critical thinking and vocabulary skills through courses focused on the rhetorical analyses of public texts (e.g., debates, laws, speeches, judicial decisions), which will deepen students' knowledge of rhetoric and political culture nationally and internationally. Those enrolling in the Z105 certificate will take classes on the campus of the University of Maryland–College Park.

Contact

Shawn J. Parry-Giles, Ph.D.
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2130 Skinner Bldg
4300 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6527

Email: spg@umd.edu

Website: http://eef.umd.edu

Courses: COMM

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105andz106.pdf)
- Admissions Exams

***Visa Eligibility:** Z106 is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	16 May
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	13 Mar

Other Deadlines: Please visit the program website at http://eef.umd.edu

Requirements

- Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.) (p. 335)

Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Required courses:		
COMM618	Professional Communication: Rhetoric & Style	3
COMM638	Professional Communication: Rhetoric & Voice	3
COMM708	Professional Communication: Rhetoric and Context	3
COMM655	Seminar in Speechwriting	3
Select two of the following:		6
COMM601	Historical-Critical Research in Communication	
COMM604	Argumentation Theory	
COMM670	Seminar in Listening Behavior	
COMM748	The Rhetoric of the Presidency	
COMM760	Seminar in Political Communication	
COMM768	Seminar in Public Address	
Total Credits		18

Project Management (online) (MEPM)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our high quality, challenging project management degree programs encompass technical expertise, behavioral competence, and strategic awareness. Courses are taught not only by esteemed faculty but also by industry experts. As the first project management program in an engineering school to be accredited by the Project Management Institute's Global Accreditation Center, the University of Maryland empowers students to put high-demand project management methods into everyday practice.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/project-management.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Project Management, Master of Engineering (M.Eng.) (p. 336)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Project Management, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENCE661	Project Cost Accounting and Finance	3
ENCE662	Introduction to Project Management	3
ENCE664	Legal Aspects of Engineering Design and Construction	3
ENCE665	Management of Project Teams	3
ENCE627	Project Risk Management	3
Select 15 credits of electives approved by advisor		15
Total Credits		30

Project Management (online) (Z040)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our high quality, challenging project management degree programs encompass technical expertise, behavioral competence, and strategic awareness. Courses are taught not only by esteemed faculty but also by industry experts. As the first project management program in an engineering school to be accredited by the Project Management Institute's Global Accreditation Center, the University of Maryland empowers students to put high-demand project management methods into everyday practice.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate

FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
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University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/project-management.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Project Management, Post-Baccalaureate Certificate (P.B.C.) (p. 337)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Project Management, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENCE661	Project Cost Accounting and Finance	3
ENCE662	Introduction to Project Management	3
ENCE665	Management of Project Teams	3
ENCE627	Project Risk Management	3
Total Credits		12

Project Management (PMPM)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our high quality, challenging project management degree programs encompass technical expertise, behavioral competence, and strategic awareness. Courses are taught not only by esteemed faculty but also by industry experts. As the first project management program in an engineering school to be accredited by the Project Management

Institute's Global Accreditation Center, the University of Maryland empowers students to put high-demand project management methods into everyday practice.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
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Office of Advanced Engineering Education
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4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/project-management.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Resident	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Project Management, Master of Engineering (M.Eng.) (p. 338)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Project Management (MEPM) for more information.

Project Management, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENCE661	Project Cost Accounting and Finance	3
ENCE662	Introduction to Project Management	3

ENCE664	Legal Aspects of Engineering Design and Construction	3
ENCE665	Management of Project Teams	3
ENCE627	Project Risk Management	3
Select 15 credits of electives approved by advisor		15
Total Credits		30

Project Management (Z063)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our high quality, challenging project management degree programs encompass technical expertise, behavioral competence, and strategic awareness. Courses are taught not only by esteemed faculty but also by industry experts. As the first project management program in an engineering school to be accredited by the Project Management Institute's Global Accreditation Center, the University of Maryland empowers students to put high-demand project management methods into everyday practice.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Coordinator for Admission and Recruitment
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4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/project-management.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Project Management, Post-Baccalaureate Certificate (P.B.C.) (p. 340)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites

around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Project Management (Z040) for more information.

Project Management, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENCE661	Project Cost Accounting and Finance	3
ENCE662	Introduction to Project Management	3
ENCE665	Management of Project Teams	3
ENCE627	Project Risk Management	3
Total Credits		12

Psychology (PSYC)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

Psychology is a remarkably broad field that studies mind and behavior at all levels of analysis ranging from the micro to the macro; from single cells to complex systems; from individuals to groups and cultures; and from invertebrates to humans. Some of these endeavors connect with the biological sciences and others with the social sciences. As analytical, methodological, and theoretical advances in one domain increasingly influence developments in another, psychologists collaborate in ever greater numbers with scientists in neighboring disciplines, resulting in new subfields that blend the biological and social sciences.

Our department reflects well this combined diversity of and collaborations among approaches. In recognition of this fact, we organized our training structure into 5 Ph.D. Specialty Areas:

- Clinical (CLIN)
- Cognitive and Neural Systems (CNS)
- Counseling (COUN)
- Developmental (DEV)
- Social, Decision, and Organizational Science (SDOS)

Research collaborations across areas are common and we encourage students to consider training across areas as well. The Department's doctoral programs in both Clinical and Counseling Psychology have been approved by the American Psychological Association. School Psychology, also an APA approved program, is offered in the College of Education.

Financial Assistance

The Department attempts to provide financial aid for all incoming students, although aid is not guaranteed. The different possible types of financial support include fellowships (nominated by the department), teaching assistantships, research assistantships, work on campus, and funded externships.

Contact

Office of Graduate Studies
Department of Psychology
1121 Biology-Psychology Building
4094 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1454
Email: psycgradstudies@umd.edu

Website: http://www.psyc.umd.edu/landing/Graduate

Courses: PSYC

Relationships: Clinical Psychological Science (MPPS) (p. 126) **Industrial/Organizational Psychology (MPIO)** (p. 252) **Neurosciences and Cognitive Science (NACS)** (p. 316)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationpsyccounseling.pdf) (Counseling Psychology only)
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationpsycsdos.pdf) (Social/Decision/Organizational Sciences only)
- Writing Sample (optional)

The Department accepts only those applicants who have demonstrated competence for completing the requirements of the doctoral degree. The typical student admitted to the graduate program has an overall

undergraduate grade point average of 3.5 or above, a psychology grade point average over 3.5, GRE scores of 155 and above for Verbal and 147 and above for Quantitative, appropriate background experiences, outstanding letters of recommendation, research experience and/or previous relevant work experience, and goals congruent with the program. The Department of Psychology encourages applications from members of racial/ethnic minority groups.

Students admitted to the graduate program often earn the M.S. en route to the Ph.D., however, this varies across specialty areas and the specific requirements within a given specialty area should be consulted. All students must be full-time until completion of all requirements of the doctoral program other than the dissertation have been met.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	30 Nov
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	30 Nov

Other Deadlines: Please visit the program website at http://www.psyc.umd.edu/landing/Graduate

Requirements

- Psychology, Doctor of Philosophy (Ph.D.) (p. 341)
- Psychology, Master of Science (M.S.) (p. 341)

Facilities and Special Resources

The Department shares a building with the Biology Department and is centrally situated on campus near three libraries and the student union. The Department has state-of-the-art laboratories, computer facilities, and video equipment. The geographic location in a suburb of Washington, D.C. provides access to a wide variety of laboratory and training facilities in governmental and other agencies. In addition, we are near the national headquarters for The American Psychological Association and Association for Psychological Science.

The Department follows all regulations involved in the use of human subjects and animals.

Psychology, Master of Science (M.S.)

The department does not offer a terminal M.S. Rather, students admitted to the graduate program often earn the M.S. en route to the Ph.D.

Course	Title	Credits
Required courses:		
PSYC601	Quantitative Methods I	4
PSYC602	Quantitative Methods II	4
PSYC799	Master's Thesis Research	6
Remainder of coursework		16
Total Credits		30

Psychology, Doctor of Philosophy (Ph.D.)

In addition to a quantitative core consisting of three courses, all students are required to take three core courses in areas outside their specialty program. These core courses are designed to provide a breadth of knowledge in psychology. Additionally, each program has requisite coursework and comprehensive examinations. A minimum of 12 credit hours for the dissertation is required for a doctoral degree. In addition to attending classes, students are expected to take part in research.

Course	Title	Credits
Core Requirements		
Select three quantitative courses		
Select additional courses		
Dissertation Research Requirements		
PSYC899	Doctoral Dissertation Research	12
Total Credits		12

[1] The remainder of the student's coursework should be decided with their advisor.

Public Administration (MPPA)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

Website: http://www.publicpolicy.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred: 17 Jan / Final: 16 May	15 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Administration, Master of Professional Studies (M.P.S.) (p. 342)

Public Administration, Master of Professional Studies (M.P.S.)

Non-thesis only: 36 credits required

The Master's of Professional Studies in Public Administration (MPPA) program provides an in-depth education for students seeking professional careers in public administration. The MPPA requires the completion of 36 credit hours in various aspects of public administration and policy. The program can be completed in either 16 months or 21 months. It is particularly appropriate for international students and uses numerous examples and case studies from around the world. It is cohort-based, with all students in a cohort taking the same courses. Please check the School's website to find out when the next cohort is expected to be formed.

Between the first and second year, and/or during the academic year, most students engage in internships in international, federal, state or local government agencies, non-profit organizations, or private firms that are engaged in public administration. In addition to offering practical experiences and the opportunity to further develop skills acquired during the first year, these internships provide students with contacts and relationships useful for future projects and job placement.

Course	Title	Credits
Core Requirements		
PLCY610	Quantitative Aspects of Public Policy	3
Select one of the following:		3
PLCY620	Political Analysis	
PLCY688	Topics in Public Policy (PLCY688A - Public Policy Seminar)	
PLCY670	Public Budgeting & Financial Management	3
PLCY711	Public Management and Leadership	3
PLCY640	Microeconomic and Policy Analysis	3
PLCY688	Topics in Public Policy (PUAF688M - Public Policy Seminar)	3
Select 6 credits of electives		6
Additional course requirements [1]		12
Total Credits		36

[1] Students should consult with their advisor to determine remaining course requirements.

Public Financial Management (Z094)

Graduate Certificate Program
College: Public Policy

Admission to this certificate program is through accepted cohorts only. Please visit the department website for more information.

Website: http://www.publicpolicy.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- CV/Resume

***Visa Eligibility**: This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Cohort only. Please contact the department for more details.	Cohort only. Please contact the department for more details.
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Cohort only. Please contact the department for more details.	Cohort only. Please contact the department for more details.

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Financial Management, Post-Baccalaureate Certificate (P.B.C.) (p. 343)

Public Financial Management, Post-Baccalaureate Certificate (P.B.C.)

Total Credits: 12 credits required

Course	Title	Credits
Core Requirements		
Select four courses [1]		12
Total Credits		12

[1] All courses are chosen with the student's advisor

Public Health Informatics (Z028)

Graduate Certificate Program
College: Public Health

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.oes.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oes.umd.edu

Requirements

- Public Health Informatics, Post-Baccalaureate Certificate (P.B.C.) (p. 343)

Public Health Informatics, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Public Health Practice and Policy (PHPP)

Graduate Degree Program
College: Public Health

Abstract

Healthcare is the largest industry in the U.S. and employs over 11 million workers. 21st century health care professionals require cutting-edge knowledge and exemplary leadership skills to enable their organizations to rise to societal, technological, ethical, financial, and public health challenges. To meet the growing demand for skilled health care professionals, the Department of Health Services Administration, School of Public Health, at the University of Maryland offers an exceptional professional learning opportunity in Public Health Practice. The Master of Public Health in Public Health Practice and Policy (MPH-PHPP) is designed to provide working professionals with the broad range of knowledge and skill-based competencies needed to assume leadership roles in addressing important public health practice and policy issues nationally and globally. The program offer courses in the fall and spring semester (16 weeks each) and Summer Term (two 6-week sessions). The curriculum and degree has the same content, quality, and high standards as the University's traditional on-site curriculum and reflects the broad range of knowledge and skill-based competencies germane to public health practice in the 21st century. Instruction is delivered by School of Public Health faculty and experts from prominent public health organizations. The School of Public Health is accredited by the Council on Education for Public Health.

Contact

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Website: http://sph.umd.edu/department/hlsa/mph-public-health-practice-and-policy

Relationships: Health Administration (HLSA) (p. 230) **Health Equity (HLEQ)** (p. 231) **Health Policy Analysis and Evaluation (HPAE)** (p. 232) **Principles of Public Health (Z076)** (p. 332)

Admissions

General Program and Admission Information for the MPH in Public Health Practice and Policy can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-public-health-practice

UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). Additional Requirements can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-public-health-practice/apply and here: http://globalmaryland.umd.edu/offices/international-students-scholar-services/graduate-admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://sph.umd.edu/department/hlsa/mph-public-health-practice-and-policy

Requirements

- Public Health Practice and Policy, Master of Public Health (M.P.H.) (p. 344)

Facilities and Special Resources

The Master of Public Health in Public Health Practice and Policy instruction is delivered in a blended learning format with stimulating on-line courses supplemented by a total of six weekends of residency. On-site weekend sessions will be held at the The university of Maryland College Park Campus. For more information, please see:

http://sph.umd.edu/department/hlsa/mph-public-health-practice-and-policy

Public Health Practice and Policy, Master of Public Health (M.P.H.)

Non-thesis only (capstone project required): 45 credits

The Master of Public Health in Public Health Practice and Policy (MPH-PHPP) is designed to provide working professionals with the broad range of knowledge and skill-based competencies needed to assume leadership roles in addressing important public health practice and policy issues nationally and globally.

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
HLSA745	Public Health Practice and Management	3
HLSA720	Health Law and Ethics	3
HLSA775	Public Health Research	3
HLSA702	Policy and Politics of Health	3
HLSA778	Internship in Public Health	4
HLSA601	Introduction to Health Systems	3
MIEH600	Foundations of Environmental Health	3
HLSA711	Health Economics and Analysis	3
HLSA740	Healthcare Strategic Planning and Marketing	3
HLSA786	Capstone Project in Public Health	3
Total Credits		45

Public Management (MAMG)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

Website: http://www.publicpolicy.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred: 17 Jan / Final: 16 May	15 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Management, Master of Public Management (M.P.M.) (p. 345)

Public Management, Master of Public Management (M.P.M.)

Non-thesis only: 36 credits required

The Master of Public Management (MPM) policy track is a 36 credit degree program for professionals with at least 5 years of policy and management experience. The program is identical to the MPP program except that students take four fewer general electives and may substitute a policy or management elective for the capstone course required in the MPP program.

Courses are offered throughout the day, but it is sometimes possible to complete the program by taking only courses beginning no earlier than 4:15pm. Students usually finish the program in three years by taking two courses each fall and spring semester, but can finish in as many as five years, or as few as one year by taking four courses in the fall and spring semesters, 1 during the winter semester, and 3 during the summer semester.

Course	Title	Credits
Required courses:		
PLCY688	Topics in Public Policy (PLCY688E - Normative and Political Dimensions of Public Policy)	3
PLCY688	Topics in Public Policy (PLCY688G - Management and Accountability)	3
PLCY640	Microeconomic and Policy Analysis	3
PLCY610	Quantitative Aspects of Public Policy	3
PLCY688	Topics in Public Policy (PLCY688R - Budgeting and Finance)	2
PLCY688	Topics in Public Policy (PLCY688I - Macroeconomics)	2
PLCY688	Topics in Public Policy (PLCY688Y - Practicing Public Policy in the 21st Century)	3
Specialization Requirements		
Select one of the following:		17
Environmental Policy		
Energy Policy		
Federal Acquisition		
International Development Policy		
International Security and Economic Policy		
Management and Leadership		
Non-profit Management and Leadership		
Public Sector Financial Management		
Social Policy		
Education Policy		
Health Policy		
Total Credits		36

Public Management (Z004)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Management, Post-Baccalaureate Certificate (P.B.C.) (p. 346)

Public Management, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Public Policy and Law (LMPO)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership, acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

CONTACT

Office of Student Affairs
School of Public Policy
2101 Van Munching Hall
7699 Mowatt Lane
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)
- JD application: Law School (JD) Requirements: applicants should check with the University of Maryland Law School (https://www.law.umaryland.edu). Applicants must apply to the M.P.P. and law programs separately and be accepted by both programs.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred: 17 Jan / Final: 16 May	15 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	28 Sep	28 Sep

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Policy and Law, Master of Public Policy and Juris Doctorate (dual degree) (M.P.P. and J.D.) (p. 346)

Public Policy and Law, Master of Public Policy and Juris Doctorate (dual degree) (M.P.P. and J.D.)

Students are required to complete 114 total credits with 39 credits in Public Policy and 75 credits taken in Law.

The University of Maryland School of Law (located in Baltimore) and the School of Public Policy offer a dual program of studies leading to both the MPP and JD degrees, in less time (often four years) and at less cost than if the degrees were obtained separately. Because they can double-count 9 credits taken at each school towards the other school, students complete 75 (versus 84) credits at the law school and 39 (versus 48) credits in the policy school, thus saving 18 credits.

Candidates must separately apply to the dual degree program in both the law school and the policy school. If admitted by only one program, the student may enroll in that program.

For further discussion of admission and degree requirements, students may consult each school's website.

Course	Title	Credits
Required courses:		
PLCY688	Topics in Public Policy (PLCY688E - Normative and Political Dimensions of Public Policy)	3
PLCY688	Topics in Public Policy (PLCY688G - Management and Accountability)	3
PLCY640	Microeconomic and Policy Analysis	3

PLCY610	Quantitative Aspects of Public Policy	3
PLCY688	Topics in Public Policy (PLCY688I - Macroeconomics)	2
PLCY688	Topics in Public Policy (PLCY688R - Budgeting and Finance)	2
PLCY688	Topics in Public Policy (PLCY688Y - Practicing Public Policy in the 21st Century)	3
PLCY688	Topics in Public Policy (PLCY688T - Team-Based Policy Lab)	3
PLCY699	Selected Topics Public Policy (PLCY699W - Policy Engagement Project)	2
PLCY790	Project Course	3
Remainder of coursework		12
Total Credits		39

Public Policy (MAPO)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

CONTACT

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Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred: 17 Jan / Final: 16 May	15 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Policy, Master of Public Policy (M.P.P.) (p. 347)

Public Policy, Master of Public Policy (M.P.P.)

Non-thesis only: 48 credits required

Most MPP students take 4 courses per semester and finish the program in two years. Students may instead take 1-4 courses each semester and complete the degree in two-five years.

Between the first and second year, and/or during the academic year, most full-time students engage in internships in international, federal, state or local government agencies, non-profit organizations, or private firms that are engaged in the policy process. In addition to offering practical experiences and the opportunity to further develop skills acquired during the first year, these internships provide students with contacts and relationships useful for future projects and job placement.

About 150 students from a wide variety of undergraduate schools and majors, from all parts of the country, and from around the world enter

the program each fall. The mean undergraduate grade point average of entering students is 3.6 and GRE scores average in the low to mid 600s.

Course	Title	Credits
Required courses:		
PLCY688	Topics in Public Policy (PLCY688E - Normative and Political Dimensions of Public Policy)	3
PLCY688	Topics in Public Policy (PLCY688G - Management and Accountability)	3
PLCY640	Microeconomic and Policy Analysis	3
PLCY610	Quantitative Aspects of Public Policy	3
PLCY688	Topics in Public Policy (PLCY688I - Macroeconomics)	2
PLCY688	Topics in Public Policy (PLCY688R - Budgeting and Finance)	2
PLCY688	Topics in Public Policy (PLCY688Y - Practicing Public Policy in the 21st Century)	3
PLCY688	Topics in Public Policy (PLCY688T - Team-Based Policy Lab)	3
PLCY699	Selected Topics Public Policy (PLCY699W - Policy Engagement Project)	2
PLCY790	Project Course	3
Specialization Requirements		
Select one of the following:		21
Environmental Policy		
Energy Policy		
Federal Acquisition		
International Development Policy		
International Security and Economic Policy		
Management and Leadership		
Non-profit Management and Leadership		
Public Sector Financial Management		
Social Policy		
Total Credits		48

Public Policy and Sustainable Development & Conservation Biology (PPCN)

Graduate Degree Program
College: Public Policy / Computer, Mathematical, and Natural Sciences

*This program is not currently accepting applications. Please visit the our graduate program listing (p. 18) for information on other programs.

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

CONTACT

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College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Admissions

This program is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu or http://www.cons.umd.edu

Requirements

- Public Policy and Sustainable Development & Conservation Biology, Master of Public Policy and Master of Science (dual degree) (M.P.P. and M.S.) (p. 348)

Public Policy and Sustainable Development & Conservation Biology, Master of Public Policy and Master of Science (dual degree) (M.P.P. and M.S.)

As environmental problems become more scientifically and politically complex, employers and researchers in the environmental analysis and policy fields are increasingly looking to hire graduates who are well-

grounded in the natural and life sciences, the workings of the public, private and non-government sectors, and the key policy analysis tools and concepts. The College of Computer, Mathematical and Natural Sciences and the School of Public Policy offer a dual program of studies leading to both the MPP and the Master of Science in Sustainable Development & Conservation Biology in less time and at less cost than if the degrees were obtained separately. Because they can double-count some credits taken in one program towards the other program, students complete a total of 60 credits in the dual program versus 48 in the policy school and 39 in the M.S. program, thus saving 27 credits. Otherwise the requirements of both degree programs must be met.

Candidates must separately apply to the dual degree program in both the M.S. program and the policy school. If admitted by only one program, the student may enroll in that program.

For further discussion of admission and degree requirements, students may consult each school's website.

Public Sector Finance & Acquisition (Z033)

Graduate Certificate Program
College: Public Policy

CONTACT

Office of Student Affairs
School of Public Policy
2101 Van Munching Hall
7699 Mowatt Lane
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	not currently accepting applications	not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	not currently accepting applications	not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Sector Finance & Acquisition, Post-Baccalaureate Certificate (P.B.C.) (p. 349)

Public Sector Finance & Acquisition, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

All courses must be approved by the student's advisor.

Course	Title	Credits
Core Requirements		
Select six courses approved by an advisor		18
Total Credits		18

Quantitative Finance (BMQF)

Graduate Degree Program
College: Business

Abstract

The University of Maryland's Robert H. Smith School of Business Master of Quantitative Finance (MQF) program is designed for students who aspire to enter into mathematically complex fields such as risk management or institutional asset management. The MQF will be one of the most rigorous, career-beneficial degrees of its kind in the Washington, D.C., area.

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Contact

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Email: masters@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

For more information about the MQF program, please contact the MBA/MS Admissions office at 301-405-2559 or masters@rhsmith.umd.edu

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Quantitative Finance, Master of Quantitative Finance (M.Q.F.) (p. 350)

Quantitative Finance, Master of Quantitative Finance (M.Q.F.)

36 credits required

Course	Title	Credits
Required courses:		
BUSI640	Corporate Finance	2
BUFN650	Financial Econometrics II	2
BUFN741	Advanced Capital Markets	2
BUFN745	Financial Programming	2
BUFN750	Valuation in Corporate Finance	2
BUFN758	Special Topics in Finance (BUFN758N - Financial Econometrics)	2
BUFN758	Special Topics in Finance (BUFN758O - Financial Econometrics II)	2
BUFN761	Derivative Securities	2
Select 20 credits of electives		20
Total Credits		36

Radar Signal Processing (Z031)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.norbertwiener.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	not currently accepting applications	not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	not currently accepting applications	not currently accepting applications

Other Deadlines: Please visit the program website at http://www.norbertwiener.umd.edu

Requirements

- Radar Signal Processing, Post-Baccalaureate Certificate (P.B.C.) (p. 350)

Radar Signal Processing, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Real Estate Development (MPRE)

Graduate Degree Program
College: Architecture

This program is not currently accepting applications. Please visit our graduate program listing (p. 18) for information on other programs.

Contact

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Website: http://www.arch.umd.edu

Admissions

This program is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Real Estate Development, Master of Professional Studies (M.P.S.) (p. 351)

Real Estate Development, Master of Professional Studies (M.P.S.)

This program is not currently accepting applications.

Real Estate Development (RDEV)

Graduate Degree Program
College: Architecture

Abstract

The Graduate Program leading to a Master of Real Estate Development is based in the School of Architecture, Planning & Preservation, but it is NOT a design degree. It was the 6th program in the country to offer a comprehensive business based, but multi-disciplinary, approach to real estate development education. There are now more than 20 of these programs offered across the US that recognize that real estate development in its actual practice is multi-disciplinary and requires weighing the financing and investment options in conjunction with consideration of the construction, design, planning and asset management of real estate. In sum -- Real Estate Development -- is all of the above: Finance Plus!! And education for everyone who has an interest in the regulation, development, acquisition, financing or management of real estate will be more effective if they have completed a comprehensive degree about real estate, and not simply 2 or 3 courses about finance and valuation.

The 33-42 credit MRED program stresses a comprehensive approach to real estate development, broadly defined, and encompasses traditional real estate finance topics but goes on to address the full range of development issues--from property acquisition, to planning and permitting, contract and property law, investment and finance, design and construction, as well as marketing, commercial leasing, property, portfolio and asset management. The program aims to assure that graduates can effectively engage lenders, investors, architects, contractors, lawyers, accountants, and public officials as well as how to bring a project in on time with dynamic marketing and efficient property management thereafter.

The program uses three key teaching/learning approaches:

1. the traditional graduate reading and research mode,

2. the popular case study review and discussion method, and

3. the active learning, or practice method, engaging the professional development community as partners in class and in the field to enliven the concepts presented in the classroom.

All of the instructors for the program are active professionals in the real estate field. Graduates are not only provided foundational real estate knowledge, but are prepared to enter the real estate industry with important skills in business writing, presentation, leadership and negotiation as well as a keen awareness of the MRED Quadruple Bottom Line and ability to develop real estate properties that are: Economically Viable, Environmentally Respectful, Socially Responsible and Beautifully Designed.

The sequence of courses and number of semesters to complete the program can be tailored to the academic preparation and any work experience of each student. There is no requirement for work experience. Students may elect an:

Accelerated Path--12 months (for students with real estate education or extensive experience);
Full time Path--15-18 months (for students not working more than 10 hours a week); or
Part Time Path--24-60 months (for students working 20 hours or more a week).
The program admits up to 30 new students in each of the Fall (late August) and Spring (late January) terms. Students have up to 5 years to complete all their coursework, although the average time for part time students is 24 months, 18 months for full time students.

The program admits up to 30 new students in each of the Fall (late August) and Spring (late January) terms. Students have up to 5 years to complete all their coursework, although the average time for part time students is 24 months, 18 months for full time students.

All real estate (RDEV) courses are offered in the evenings on one night a week, with courses scheduled Mondays through Fridays in the Spring and Fall terms. Some courses are delivered in executive-style workshop format over long weekends. Limited courses are offered evenings in Summer and Winter on more intensive schedules. Electives in other programs may be scheduled late afternoon or on multiple days. Students may use one elective course to take a study abroad course offered by any of the programs in the School, provided the academic advisor verifies sufficient real estate content to the course. Additional reduced fee courses in desirable skills are periodically offered through the Colvin Institute, such as preparation for the LEED exams, ARGUS, Co-Star and REFM Financial Modeling.

While the program is quite flexible, there are some restrictions to consider. Students who are working full time are not permitted to take more than two courses in any one semester. Course offerings in the Winter and Summer term are very limited, and students may not enroll in more than one course in the Winter and two in the Summer. Scholarship funds are not available for Winter, Summer, and Study Abroad courses. Students desiring to follow the accelerated path (4 courses per term) need to request early advising and plan their course sequence carefully and may not be working even part time. Completion of the degree in 12 months is only guaranteed to be available for students starting in the Fall term and only for those who have real estate finance education or experience.

Financial Assistance

The Program provides scholarship funds to a number of qualified students, both part time and full time, each term. Scholarship determinations are made at the time of application and admission. Scholarships are awarded on a per course basis and commitments are made at the time of admission and apply to the entire program (other

than Study Abroad, Summer and Winter courses), subject to academic performance.

The Colvin Institute offers a limited number of administrative positions to full-time MRED students. Contact the Program Director to apply.

Periodically there are named scholarships provided by various real estate organizations or development companies.

In addition, there are work opportunities both on, and off campus, and they are relatively plentiful. Students in the past have been successful in finding part time internships and full-time work with local real estate companies. The MRED student listserv posts openings periodically as they are brought to the attention of the Program by alumni, friends, faculty, and sponsors.

Applicants should inquire as to the availability of funding for the term they are starting. Scholarships are typically for a portion of tuition only, and are paid on a per course basis as a student progresses through the program. Scholarships are available to part time, full time, and accelerated students.

If tuition costs are a major factor in your choice of real estate program, please contact us about financing possibilities. The total cost of the MRED degree is the most competitive in the region, and one of the lowest nationally, with a cost-benefit ratio that is unparalleled. There are also significant University and Colvin Institute resources available for student enrichment activities such as support for competitions, site visits, and attendance at local, regional and national real estate events.

The MRED program is known for sending 6 teams to the Final Four of the international ULI/Hines Competition, and taking first prize twice. It is also known for sending 2 teams to the Final Four of the HUD Innovation in Affordable Housing Competition, and taking first prize once. It should be noted that the HUD Competition is only 5 years old.

Contact

To arrange a visit, phone interview, or for more information, please contact the Program Director, Maria Day-Marshall, at mdaymars@umd.edu. Additional information on case competitions, samples of student work, as well as syllabi and adjunct faculty bios can be found at the MRED Program's Web site (http://arch.umd.edu/rdev/real-estate-development) and the Colvin Institute site at http://colvininstitute.org. For information about our industry supporters and Colvin Institute activities go to http://colvininstitute.org. You will also find the Colvin Institute providing outreach and information at the ICSC in Las Vegas each May, at the ULI or NAIOP National Conference each Fall, and at many local events of Bisnow, ICSC, ULI, CREW, NAIOP, AAREP, and HAND.

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Courses: ARCH CCJS ECON HISP PUAF RDEV URSP

Relationships: Architecture (ARCH) (p. 50) **Historic Preservation (HISP)** (p. 238) **Landscape Architecture (LARC)** (p. 273) **Urban and Regional Planning and Design (URPD)** (p. 422)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE), Law School Admissions Test (LSAT), or Graduate Management Admission Test (GMAT)
- CV/Resume
- Skills Assessment: This assessment is not used in determining your admission to the program. Self assessments are used for placing students into the proper sequence of courses once admitted. (This is a section within the online application.)
- Writing Sample: (A writing sample of 3-5 pages in business style writing related to real estate. This can be previous individual academic or professional work. Any confidential information should be redacted.)

Acceptance to the program is on a competitive basis. Applicants are required to have a minimum undergraduate grade point average (GPA) of 3.0 on a 4.0 scale from an accredited University. Applicants who demonstrate a strong interest and aptitude with a GPA below 3.0 may be considered based on recommendations or proven success in the field. Such applicants are admitted provisionally and may be required to do additional course work.

Applicants for the MRED program are required to submit a GRE/GMAT/LSAT score, unless they are 5 or more years beyond the granting of their undergraduate degree.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	18 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	27 Sep

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Real Estate Development, Master of Real Estate Development (M.R.E.D.) (p. 353)

Facilities and Special Resources

The University of Maryland is an exceptional location for the pursuit of graduate studies in the field of real estate development, and graduate students are encouraged to take advantage of the opportunities. The University is eight miles from the incomparable library and research facilities of Washington, D.C. In the nation's capital, MRED graduate students have access to the Library of Congress, as well as the specialized collections of professional associations and international organizations, such as the National Association of Home Builders, the Urban Land Institute, the American Institute of Architects, and the National Building Museum. Access to agencies at all levels of government---municipal, county, state and federal--which regulate various aspects of real estate are all available and engaged with the program.

Close by the University are key historically important and interesting places in the development of U.S. communities, including the 4th settlement in America at Historic St. Mary's City in Southern Maryland, which was the first planned city in America. Just 10 minutes from campus is the 1930s iconic new town (cooperative) of Greenbelt, Maryland, and within 45 minutes are the 1960's new towns of Columbia, Maryland, St. Charles, Maryland and Reston, Virginia. One of the best examples of New Urbanism is the Kentlands development less than 30 minutes away in Gaithersburg, MD. And not to be missed are the major redevelopment and urban living revivals in the Port City of Baltimore and the historic neighborhoods of Anacostia and Columbia Heights in the District of Columbia, as well as the suburbs that are reinventing themselves in the close in suburbs to the District in Northern Virginia and Maryland.

The program is also the home of the Colvin Institute of Real Estate Development, endowed by the late John Colvin and his wife and Karen. The Institute supports the outreach to the industry through a Council of Advisors, as well as various networking and high profile real estate events on and off campus. Also associated with the School is the National Center for Smart Growth Research and Education, which involves faculty and graduate students from several campus units in multi-disciplinary research on the fiscal, environmental and social impacts of alternative development patterns; evaluation of growth management strategies, transportation patterns and planning therefor, as well as technical assistance to state agencies and local jurisdictions.

The program's location in College Park, Maryland, with direct Metro access to downtown Washington, D.C. and easy access up the Baltimore-Washington Parkway to Baltimore City, makes field work, site visits and interaction with ongoing real estate developments and developers one of the signature features of the MRED program.

The MRED Council of Advisors, as well as adjunct faculty who are active professionals in all aspects of real estate development, are eager to engage with students in the program which offers formal and informal occasions for advice about the current trends in the industry as well as the possibility of full- or part- time employment or internships.

There is an active student real estate club, SoRED, and also a strong MRED alumni group who are very effective in helping each other find positions as well as post jobs from where they are for current MRED students to consider. Announcements about full time and intern positions are posted to the MRED list serve frequently. Adjunct faculty and guest speakers also are generally very willing to help students network and connect with employment resources once they have completed their core courses. The School also has a placement officer who is available by appointment to help students in their search.

Real Estate Development, Master of Real Estate Development (M.R.E.D.)

Non-thesis only (capstone project required): 33 credits-42 credits

MRED is a 33-42 credit hour professional masters degree in real estate development. There are 3 core required courses in Development Law, Fundamentals of Finance and the Capstone final course. There are 5 cognate areas from which a course must be taken to fulfill degree requirements.

Electives may be selected in focus areas of: Advanced Finance, Sustainability, Affordable Housing, Historic Preservation and Urban Planning. There are also electives in types of real estate such as retail, hospitality, and leadership and negotiation skills. Electives may also be taken in any of the cognate areas of Construction, Valuation, and Asset Management.

Applicants without education or work experience in real estate, particularly real estate finance, accounting and valuation are admitted subject to adding 3 to 9 credits of additional RDEV course work in the first or second term of their MRED degree program. Students with no background can expect to be subject to the full 9 credits; most applicants have 3 - 6 additional credits to complete.

Admitted Students are required to attend a 2 1/2-day Bootcamp (Assessment and Orientation Program) (Friday night through Sunday afternoon) prior to their first semester of taking RDEV courses.

Students may be required, based on the introductory Assessment sessions or subsequent classwork, to take additional evening or weekend coaching courses/sessions in Excel skills, business writing or oral presentation. Successful completion of all supplemental coaching sessions is required for graduation.

Graduates must achieve a 3.0 GPA in all coursework, including the final capstone course or research project and publicly present their capstone work to a jury in order to be awarded the MRED degree.

Students must meet minimum professional writing and presentation standards, and complete successfully all excel, business writing, and oral presentation and skills non-credit courses or coaching as are offered and required during the period of enrollment. These courses may incur an additional charge paid to the Colvin Institute.

International Students also must test out or successfully complete within two semesters the University English writing courses as determined by the Office of International Student and Scholar Services (ISSS).

The MRED program is highly flexible which allows for tailoring the required core and cognate courses to a student's background and interest, such that a student with a strong background in architecture, law, planning, public policy or finance, could substitute out of the core/cognate course in their area of expertise and add a more advanced course or an unrelated RDEV elective with the advice and approval of the Director. The course work for the core courses is very intense, and off site visits are required in most courses anywhere from 1 to 3 times per

semester some of which are scheduled for weekend hours, and some during working hours in limited instances.

Limited Courses are offered during Summer and Winter terms. Students may take no more than two courses over the Summer terms and one course in Winter term. The maximum number of credits toward the MRED degree that may be taken in Summer/Winter terms is twelve (12). One course (no more than 3 credits) may be credited toward the MRED degree for program approved Study Abroad courses. See the Program Director for details before applying for any Study Abroad course. Certificate students are subject to the same requirements as above, but may not take elective or advanced courses or apply a Study Abroad course to the certificate.

Course	Title	Credits
Required courses:		
RDEV610	Real Property Development Law and Ethics	3
RDEV630	Real Property Finance and Investment	3
RDEV690	Capstone Project: Real Property Feasibility Study	3
Cognate courses:		
RDEV615	Principles, Process and Politics of Planning for Real Property Development	3
RDEV620	Market Analysis for Real Property Development	3
RDEV640	Principles of Urban Design for Real Property Developers	3
RDEV650	Essentials of Design and Construction Management for Development Professionals	3
RDEV660	Commercial Leasing for Real Property Developers	3
Select 9 credits of electives		9
Additional credits [1]		0-9
Total Credits		33-42

[1] Up to 9 additional credits may be required if there is not adequate educational background. Students should check with their advisor.

Real Estate Development (Z029)

Graduate Certificate Program
College: Architecture

Abstract

The Graduate Certificate in Real Estate Development is a 12 - 21 credit program, depending on the work experience and academic preparation of the applicant. The Certificate is primarily designed for obtaining the introductory basics of real estate development for those who may not yet have determined to make their career in the field. However, the courses required may be adapted to prior experience or level of expertise for those who are looking for advanced work. The Certificate is comprised of the two fundamental courses for the Master's degree plus two cognate courses, as well as any courses (3 - 9 credits) that would be additional preparation courses as specified in an admission letter. The basic and preparatory courses are all offered to Masters students as well, and Certificate students are not in separate courses for either preparatory courses or for the RDEV (real estate development) courses.

Up to four courses taken as part of the Certificate may be counted toward the MRED degree upon completion of the certificate if the student applies and is accepted into the MRED degree program. Successful completion of the Certificate with grades of B or better assures admission to the MRED program. Up to additional 9 credits of leveling coursework may be required before a Certificate student may move on to the core real estate certificate courses, depending on the background and experience of the applicant.

Students subsequent to admission are subject to three assessments: of Excel Skills, Business Writing and Oral Presentation skills. Students who do not meet minimum standards in the Orientation assessments, or if determined during early coursework that skills are insufficient, may be required to take additional evening or weekend coaching courses in order to meet the Program's Professional Skills Standards.

Generally, Certificate Students take 6 credits (2 courses) per term, and can finish in two terms, if no additional leveling preparatory courses are required. Students required to complete a full 21 credits, can still finish in 15 months by taking classes through two summer sessions as well as 3 spring and fall terms. However, a Certificate student may, if they are not working, take a maximum of four courses per term. There is no guarantee that the four required courses for the Certificate, however, will be offered in each term. There is more information about the courses and teaching methods used for the Graduate Certificate Real Estate Development sequence at the catalogue entry for RDEV -- Real Estate Development. There is also information on all the real estate graduate programs, including dual degrees available with business,l historic preservation, and architecture at the website www.arch.umd.edu/real_estate_development.

Certificate students are not eligible to take elective RDEV courses or the Capstone course prior to admission to the Master's program. Certificate students may, on a space available basis, participate in Study Abroad courses, but not for credit towards the Certificate degree.

Financial Assistance

Financial aid through the University administered federal loan programs is now available for Certificate students. This is an exception to the general rule, and is based on application and approval received from the federal government as to the standards of admission and requirements of the program. Contact the Program Director after application as to any available Program scholarship assistance, which, depending on the term, may or may not be available for Certificate students. Scholarship awards from the Program are never available for Summer and Winter term courses or for Study Abroad.

Contact

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Email: mdaymars@umd.edu

Website: http://www.arch.umd.edu/real-estate-development

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Skills Assessment: This assessment is not used in determining your admission to the program. Self assessments are used for placing students into the proper sequence of courses once admitted. (This is a section in the online application.)

Acceptance to the Certificate program is competitive. Applicants are required to have a minimum undergraduate grade point average (GPA) of 3.0 on a 4.0 scale from an accredited University. Applicants who demonstrate a strong interest and aptitude with a GPA below 3.0 may be considered on a case by case basis if they show a strong aptitude and/or experience in the field. Such applicants are admitted provisionally based on meeting grade expectations in the program and likely will be required to take additional courses.

No transfer credits from graduate work in other programs at the University of Maryland, or other academic institutions, are accepted towards the Certificate.

Incoming students are required to attend a two day Bootcamp (Orientation and Assessment Program) on the Saturday and Sunday before the beginning of the term in which they take their first course. Based upon Assessments of Professional Skills, additional coaching sessions on Saturdays or late afternoons (5:00 - 7:00pm) may be required for those who do not meet minimum skills in Excel, Business Writing and Oral Presentation. Fees may be charged for such courses, although currently the Colvin Institute covers the cost. Attendance at the Assessment sessions and any follow-up coaching is required to be awarded the Certificate, although the grading is on a pass/fail basis.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 Jul	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.arch.umd.edu/real-estate-development

Requirements

- Real Estate Development, Post-Baccalaureate Certificate (P.B.C.) (p. 355)

Facilities and Special Resources

The Facilities and Special Resources available to RDEV (Master of Real Estate Development students) are generally available to Graduate Certificate students. Although, Certificate students may not participate in supported competitions, and financial aid may be more limited. Certificate students are not eligible to take the Capstone course, without applying and completing the Master's requirements. To read about the extent of the facilities and special resources available please check the catalogue of the RDEV program or the web site at www.arch.umd.edu/real_estate_development

Real Estate Development, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

A 12 - 21 credit introductory program to real estate development. Recommended for those considering whether to move into the real estate development field full time. Courses may be applied to the Master of Real Estate Development Program, if a student desires to go on to full professional preparation

The 4 required courses of the Certificate are Development Law, Process and Ethics; Fundamentals of Development Finance, and 1 course from two of the following groups: Urban Design, Asset and Property Management, Planning and Entitlements Policy and Practice, and Design and Construction Management. For students without academic preparation in finance, accounting and economics additional leveling courses are required in those areas before proceeding to the required courses. Students may begin the Certificate program in either the Fall or Spring terms. Applications are reviewed and admission decisions are issued on a rolling basis

Waivers of the deadline for domestic applicants may be available depending on the number of applicants already admitted.

Course	Title	Credits
Core Requirements [1]		
RDEV688	Selected Topics in Real Estate Development (RDEV688A - Development Law)	3
RDEV630	Real Property Finance and Investment	3
Select two additional courses from cognate areas in Design, Construction, Asset Management and Planning/Entitlements		6
Total Credits		12

[1] Students without finance and real estate education or experience typically take an additional 5-9 credits

Regulatory Science and Engineering (Z087)

Graduate Certificate Program
College: Engineering

CONTACT

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Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. International applicants should consider applying for the online programs (https://gradschool.umd.edu/engineering/cert-online).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	not currently accepting applications	not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	not currently accepting applications	not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oaee.umd.edu

Requirements

- Regulatory Science and Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 356)

Regulatory Science and Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
BIOE689	Special Topics in Bioengineering (BIOE689R - Introduction to Regulatory Affairs: Devices and Drugs)	3
BIOE689	Special Topics in Bioengineering (BIOE689Q - Clinical Study Data Analysis)	3
BIOE689	Special Topics in Bioengineering (BIOE689I - Regulatory Law: Medical Devices)	3
Select one additional approved course		3
Total Credits		12

Reliability Engineering (ENRE)

Graduate Degree Program
College: Engineering

Abstract

Reliability Engineering is an interdisciplinary program of the Department of Mechanical Engineering. The academic and research programs are based upon the recognition that the performance of a complex system is affected by engineering inputs that begin at conception and extend throughout its lifetime. Students may specialize in Assessment (Root-Cause Failure Analysis, Probabilistic Risk Assessment, Common-Cause Failures); Testing and Operation (Operator Advisory Systems, Human Reliability, Software Reliability); Manufacturing (Statistical Process Control, Improved Manufacturing Methods); Component and Structures Reliability (Microelectronics and Materials); or Electronic Packaging Reliability.

Financial Assistance

Financial assistance is available to highly qualified students in the form of research and teaching assistantships. The most outstanding applicants are offered fellowships. Students seeking financial assistance are asked to submit with their applications a current resume or CV as well as a statement regarding their qualifications and/or past research or teaching experience. Financial assistance is sought for all worthy students.

Contact

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Website: http://www.enme.umd.edu

Courses: ENRE

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (recommended)
- CV/Resume
- Publications/Presentations

The Program offers graduate study leading to the Master of Science, Professional Master of Engineering (offered through the Office of Advanced Engineering Education), and Doctor of Philosophy degrees and is open to students who have a Bachelor of Science degree in engineering, physics, or mathematics and obtained a GPA of at least 3.0 on a 4.0 scale from accredited programs. An individual plan of graduate study compatible with the student's interest and background is established by the student in consultation with an advisor. In some cases, it may be necessary to require background courses to fulfill prerequisites.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 1 Dec / Final: 15 May	Preferred: 14 Oct / Final: 14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.enme.umd.edu

Requirements

- Reliability Engineering, Doctor of Philosophy (Ph.D.) (p. 357)
- Reliability Engineering, Master of Science (M.S.) (p. 357)

Facilities and Special Resources

Students and faculty have access to a host of special facilities in the College of Engineering, including the nuclear reactor, an 8-MeV electron linear accelerator; environmental chambers; mechanical testing, SEM, X-ray and imaging facilities; and extensive computer resources. The program also has a complete failure analysis laboratory.

Reliability Engineering, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

The M.S. degree program offers thesis and non-thesis options. The thesis option requires 24 credit hours of coursework and 6 credits of thesis research. Students who enroll directly in the Ph.D. program or students who transfer into the Ph.D. program from the M.S. program by passing the Ph.D. qualifying examination may obtain a non-thesis M.S. degree upon advancing to doctoral candidacy. The non-thesis option requires 30 credit hours of coursework, a scholarly paper, and presentation. All students must complete the Program Core requirements as well as all of the Graduate School requirements.

The Professional Master of Engineering (M.Eng.) program in Reliability does not require a thesis, but students must complete at least 30 credits of approved coursework.

Course	Title	Credits
Core Requirements		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Reliability Analysis	3
Thesis or Non-Thesis Requirements		
Select one of the following options:		24
Thesis:		
Select 24 credits of coursework		
ENRE799	Master's Thesis Research (6 credits)	
Non-Thesis:		
Select 30 credits of coursework		
Scholarly paper		
Total Credits		30

Reliability Engineering, Doctor of Philosophy (Ph.D.)

1. Doctoral students compile a program of study with their advisor, which is then submitted to the Graduate Studies Office of the Department of Reliability Engineering for approval. This should be submitted in the first semester of study.
2. Doctoral students must complete 36 credits of courses with at least 30 credits at the 600 level or above, including the required courses for the M.S. degree (ENRE600 and ENRE602).
3. In addition, students must complete 12 credits of ENRE899.
4. Students must pass the Ph.D. qualifying examination and successfully produce and defend a Ph.D. dissertation on an original research topic after the core courses and at least two additional ENRE elective courses are taken.

For the Ph.D. degree, students must complete a minimum of 36 credits of approved graduate courses (a minimum of 18 credits of coursework at the University of Maryland) and 12 credits of dissertation research, with a minimum 3.0 GPA overall. In addition, students must pass the Ph.D.

qualifying examination and successfully produce and defend a Ph.D. dissertation on an original research topic after the core courses and at least two additional ENRE elective courses are taken. The GPA for these four courses must be 3.5 or higher.

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Reliability Analysis	3
Select 30 credits of additional courses		30
Dissertation Research Requirements		
ENRE899	Doctoral Dissertation Research	12
Total Credits		48

Reliability Engineering (online) (MERE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our reliability engineering degree program provides qualified engineers with the tools they will need to better understand the factors that cause components and systems to fail. This interdisciplinary option is offered by the Department of Mechanical Engineering. Students pursuing a reliability engineering masters degree will study topics such as the mechanisms and physics of failure, methods for reliability, maintainability engineering, life cycle costing, and equipment sparing policies.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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University of Maryland
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Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/reliability.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Reliability Engineering, Master of Engineering (M.Eng.) (p. 359)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and

webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Reliability Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Reliability Analysis	3
Select 24 credits of electives approved by advisor		24
Total Credits		30

Reliability Engineering (online) (Z042)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our reliability engineering degree program provides qualified engineers with the tools they will need to better understand the factors that cause components and systems to fail. This interdisciplinary option is offered by the Department of Mechanical Engineering. Students pursuing a reliability engineering masters degree will study topics such as the mechanisms and physics of failure, methods for reliability, maintainability engineering, life cycle costing, and equipment sparing policies.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/reliability.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	14 Dec

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 360)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Reliability Analysis	3
Select two additional approved ENRE courses		6
Total Credits		12

Reliability Engineering (PMRE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our reliability engineering degree program provides qualified engineers with the tools they will need to better understand the factors that cause components and systems to fail. This interdisciplinary option is offered by the Department of Mechanical Engineering. Students pursuing a reliability engineering masters degree will study topics such as the mechanisms and physics of failure, methods for reliability, maintainability engineering, life cycle costing, and equipment sparing policies.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
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Telephone: 301.405.7712
Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/reliability.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Reliability Engineering, Master of Engineering (M.Eng.) (p. 361)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Project Management (MERE) for more information.

Reliability Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Reliability Analysis	3
Select 24 credits of electives approved by advisor		24
Total Credits		30

Reliability Engineering (Z064)

Graduate Certificate Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our reliability engineering degree program provides qualified engineers with the tools they will need to better understand the factors that cause components and systems to fail. This interdisciplinary option is offered by the Department of Mechanical Engineering. Students pursuing a reliability engineering masters degree will study topics such as the mechanisms and physics of failure, methods for reliability, maintainability engineering, life cycle costing, and equipment sparing policies.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Email: cgover@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/reliability.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 362)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Project Management (Z042) for more information.

Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Reliability Analysis	3
Select two additional approved ENRE courses		6
Total Credits		12

Risk, Compliance, and the Law (Z108)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The **Graduate Certificate of Professional Studies in Risk, Compliance, and the Law**, offered through the Center of the Study of Business Ethics, Regulation, & Crime, provides post-baccalaureate training and knowledge in the interdisciplinary fields of business law, ethics, criminology, and accounting. This program, along with the Center of the Study of Business Ethics, Regulation, & Crime, is a joint effort between the College of Behavioral and Social Sciences and the Robert H. Smith School of Business.

Financial Assistance

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines (https://fafsa.ed.gov/deadlines.htm).

Contact

Sally Simpson
Director, Center for the Study of Business Ethics, Regulation, & Crime
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College Park, MD 20742

Telephone: 301.405.4726
Email: ssimpson@umd.edu

Website: http://riskcert.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Applicants must meet the following minimum admission criteria as established by the Graduate School:

- Applicants must have earned a four-year baccalaureate degree from a regionally accredited U.S. institution, or an equivalent degree from a non-U.S. institution.
- Applicants must have earned a 3.0 GPA (on a 4.0 scale) in all prior undergraduate and graduate coursework.
- Applicants must provide an official copy of a transcript for all of their post-secondary work.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	not currently accepting applications for Fall 2018
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	not currently accepting applications for Fall 2018

Other Deadlines: Please visit the program website at http://riskcert.umd.edu

Requirements

- Risk, Compliance, and the Law, Post-Baccalaureate Certificate (P.B.C.) (p. 363)

Facilities and Special Resources

To serve the needs of working professionals, courses in Risk, Compliance, and the Law Certificate program are currently offered 100% online in a hybrid format where students will be expected to work both individually and in teams to complete course requirements asynchronously, as well as to participate once per week in a synchronous lecture.

Risk, Compliance, and the Law, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Full-time students complete the 12-credit program in one year by taking three credits (one course) in each of the four 12-week terms. A minimum 3.0 GPA is required to maintain good academic progress for graduation. Students are responsible for keeping track of their progress and should review their academic record to ensure accuracy.

Course	Title	Credits
Required courses:		
BERC600	Legal and Regulatory Compliance	3
BERC601	White-Collar Crime and Victimization	3
BERC602	Accounting and Its Uses in the Forensic Process	3
BERC603	Investigative tools and Data Analysis	3
Total Credits		12

Robotics Engineering (Z084)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our program curriculum is designed to build understanding and expertise in robotics design, modeling, control systems, autonomous vehicle planning and perception, machine learning, and human-robot interaction. With a range of technical electives, students pursuing a robotics engineering degree are able to tailor their coursework towards their area of interest in robotics including artificial intelligence, computer vision and perception, space and planetary robotics, robot kinematics and dynamics, control, networked robotic systems, robotics at micro and Nano scale, and rehabilitation robotics.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
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Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/robotics.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Robotics Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 364)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Robotics Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENPM662	Introduction to Robot Modeling	3
ENPM667	Control of Robotic Systems	3
ENPM661	Planning for Autonomous Robots	3
ENPM673	Perception for Autonomous Robots	3
Total Credits		12

Robotics (PMRO)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our program curriculum is designed to build understanding and expertise in robotics design, modeling, control systems, autonomous vehicle planning and perception, machine learning, and human-robot interaction. With a range of technical electives, students pursuing a robotics engineering degree are able to tailor their coursework towards their area of interest in robotics including artificial intelligence, computer vision and perception, space and planetary robotics, robot kinematics and dynamics, control, networked robotic systems, robotics at micro and Nano scale, and rehabilitation robotics.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/robotics.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Robotics, Master of Engineering (M.Eng.) (p. 365)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Robotics, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENPM661	Planning for Autonomous Robots	3
ENPM662	Introduction to Robot Modeling	3
ENPM667	Control of Robotic Systems	3
ENPM673	Perception for Autonomous Robots	3
Two courses from the following list:		6
ENPM808	Advanced Topics in Engineering (ENPM808F - Robot Learning)	
ENPM808	Advanced Topics in Engineering (ENPM808J - Rehabilitation Robotics)	
ENPM808	Advanced Topics in Engineering (ENPM808K - Human Robot Interaction)	
ENPM808	Advanced Topics in Engineering (ENPM808P - Manufacturing and Automotion)	
ENPM808	Advanced Topics in Engineering (ENPM808X - Software Development for Robotics)	
ENPM808	Advanced Topics in Engineering (ENPM809B - Building a Manufacturing Robot Software System)	
Electives approved by advisor		12
Total Credits		30

School Counseling (COSC)

Graduate Degree Program
College: Education

Abstract

The graduate programs in Counseling Psychology, School Psychology, and Counselor Education (CoPE) include several distinct areas of specialization that are designed to provide the knowledge and skills needed for practice and scholarship in counseling and related human service professions. These fields are concerned with assisting people individually, in groups, and in organizations to attain their optimal level of personal, social, educational, and career functioning. Graduates are employed in a variety of settings including schools, colleges and universities, mental health agencies, business and industry, government agencies, and other community service and practice facilities. Depending on the specific area of specialization and level of training, program graduates may serve as researchers, educators, supervisors, psychologists, counselors, or program administrators.

Master's level professional entry-level training is offered in the School Counseling program, which prepares students to become school counselors in elementary, middle, and high school settings. School counselors are leaders, advocates, and systemic change agents who provide individual and group counseling to school-aged children, develop and implement comprehensive developmental school counseling programs, and collaborate with all key stakeholders, including classroom teachers, school administrators, parents, and community members, to ensure the academic, personal-social, and college-career development of students.

The Ph.D. degree is offered in two areas of specialization: Counseling Psychology (in collaboration with the Psychology Department) and School Psychology. Doctoral studies prepare students to achieve exceptional competence in the theory and practice of their field; to develop a high level of skills as researchers, educators and administrators; and to assume positions of leadership in relevant settings. Students in the specialization of Counseling Psychology are prepared to work as researchers, educators, psychologists, and supervisors in such settings as academic departments, college and university counseling centers, and community mental health agencies. Doctoral-level school psychologists serve as researchers, university faculty, supervisors, administrators, and advanced level practitioners. Program accreditation within CoPE includes: The School Psychology and Counseling Psychology doctoral programs are accredited by the American Psychological Association (APA). The School Psychology doctoral program is approved by the National Association of School Psychologists (NASP), and is also approved for certification by the Maryland State Department of Education. The School Counseling masters program is approved by the Maryland State Department of Education.

Note that, since 2012, the CoPE graduate programs have been part of a new department, the Department of Counseling, Higher Education, and Special Education. The CoPE programs were previously housed in the Department of Counseling and Personnel Services.

The **School Counseling** (http://www.education.umd.edu/CHSE/academics/specialization/SchoolCounseling.html) Program at the University of Maryland resides in the number one ranked counseling department (U.S. News and World Report). Graduates of our School Counseling Program are eligible for certification as school counselors in Maryland and other states. The School Counseling Program prepares professional school counselors who will be *leaders, advocates,* and *systemic change agents* in K-12 urban educational settings.

Financial Assistance

Graduate Assistantships (GAs) are not available for masters level students in the Department. However, there are a number of GAs offered throughout the university, which provide tuition support and a living allowance. Once admitted into the program, students will receive guidance and information on how to secure GAs on campus.

Contact

Ryan Sappington
Graduate Assistant
Department of Counseling, Higher Education, and Special Education
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Carol Scott
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3214 Benjamin Building
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Fax: 301.405.9995
Email: cscott18@umd.edu

Website: http://www.education.umd.edu/CHSE/academics/specialization/SchoolCounseling.html

Courses: EDCP

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationcosc.pdf)

See School Counseling program website for additional information http://www.education.umd.edu/CHSE/admissions/admission_criteria/SCAdmit.html.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Dec

Other Deadlines: Please visit the program website at http://www.education.umd.edu/CHSE/academics/specialization/SchoolCounseling.html

Requirements

- School Counseling, Master of Education (M.Ed.) (p. 367)

Facilities and Special Resources

All master's, A.G.S., and doctoral students are required to include supervised fieldwork experiences in their degree programs. The CoPE programs have excellent cooperative relationships with on-campus facilities, such as the Counseling Center and Health Center. Fieldwork may also be done at a wide variety of school systems, colleges and universities, and counseling services and mental health agencies in the Baltimore/Washington metropolitan area, or nationally.

In addition to campus and program resources, students utilize the many major research and professional institutions that are easily accessible to the campus. These include the Library of Congress, the National Library of Medicine, the National Institutes of Health, the Institute of Education Sciences, professional associations such as the American Counseling Association, the American Psychological Association, and the National Association of School Psychologists.

School Counseling, Master of Education (M.Ed.)

Non-thesis only: 60 credits required

Professional entry-level program is offered: a Master of Education (M.Ed.) without thesis in School Counseling. Coursework includes one 100-hour practicum and two 300-hour internships in schools in Prince George's County, District of Columbia, Baltimore City, and other urban public school systems. Students also take courses in counseling, school counseling, research methods, and special education. Students are typically full-time and complete the program in two years.

For more information, please contact Ryan Sappington (rsapp7@umd.edu), Graduate Assistant, School Counseling.

Course	Title	Credits
Required courses:		
EDCP610	Professional Orientation	3
EDCP616	Counseling II: Theory and Practice	3
EDCP618	Counseling Skills: Introduction to Practicum	3
EDCP622	Human Development in the Counseling Context	3
EDSP600	Issues and Trends in Educating Individuals with Disabilities	3
EDCP665	Family and Social Support Systems	3
EDCP612	Multicultural Issues in Counseling and Personnel Services	3
EDCP621	Practicum in School Counseling	3
EDCP651	Group Counseling in Schools	3
EDCP879	Internship in School Counseling	9
EDCP870	Professional Issues Seminar	3
EDCP611	Career Development Theory and Programs	3
EDCP635	School Consultation I	3
EDCP615	Counseling I: Appraisal	3
EDCP652	Research in Counseling	3
EDCP625	Counseling the Chemically Dependent	3
EDCP797	Capstone Course: Program Planning	3
EDCP620	Introduction to Mental Disorders	3
Students must also submit a scholarly paper		
Total Credits		60

School Librarianship (Z114)

Graduate Certificate Program
College: Information Studies

Abstract

The Certificate of Professional Studies in School Librarianship will provide individuals with the coursework required to qualify for certification as a school librarian (library media specialist) in Maryland and in other states with similar certification requirements. The eight required courses, all offered online, may be completed within an 18 month period.

In order to enroll in the certificate program, individuals must have a Master's of Library and Information Science degree or a Master's degree in another field of study and a degree in Education or substantial K-12 teaching experience.

Website: http://ischool.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE): The GRE may be waived if an applicant meets the following criteria: he/she is a domestic applicant with a cumulative undergraduate GPA of 3.5 or above; or a domestic applicant with a cumulative undergraduate GPA of 3.0 or above who has earned a graduate degree(s). (The cumulative undergraduate GPA is calculated by taking the average from all undergraduate courses taken.)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Rolling until 31 July	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Rolling until 31 July	N/A

Other Deadlines: Please visit the program website at http://ischool.umd.edu

Requirements

- School Librarianship, Post-Baccalaureate Certificate (P.B.C.) (p. 368)

School Librarianship, Post-Baccalaureate Certificate (P.B.C.)

24 credits required

Course	Title	Credits
Required courses:		
INST650	Facilitating Youth Learning in Formal and Informal Environments	3
INST651	Promoting Rich Learning with Technology	3
LBSC641	Selecting and Evaluating of Resources for Learning	3
LBSC645	Literature and Materials for Children	3
LBSC646	Literature and Materials for Young Adults	3
LBSC741	Seminar in School Library Administration	3
LBSC742	Collaborative Instructional Design and Evaluation	3
Select one of the following: [1]		3
LBSC671	Creating Information Infrastructures [1]	
LBSC744	Internship in School Libraries [1]	
Total Credits		24

[1] Students with Education degrees and/or teaching experience are required to take LBSC671. Students who do not have Education degrees or teaching experience are required to take LBSC744

School Psychology (COSP)

Graduate Degree Program
College: Education

Abstract

The graduate programs in Counseling Psychology, School Psychology, and Counselor Education (CoPE) include several distinct areas of specialization that are designed to provide the knowledge and skills needed for practice and scholarship in counseling and related human service professions. These fields are concerned with assisting people individually, in groups, and in organizations to attain their optimal level of personal, social, educational, and career functioning. Graduates are employed in a variety of settings including schools, colleges and universities, mental health agencies, business and industry, government agencies, and other community service and practice facilities. Depending on the specific area of specialization and level of training, program graduates may serve as researchers, educators, supervisors, psychologists, counselors, or program administrators.

Master's level professional entry-level training is offered in the School Counseling program, which prepares students to become school counselors in elementary, middle, and high school settings. School counselors are leaders, advocates, and systemic change agents who provide individual and group counseling to school-aged children, develop and implement comprehensive developmental school counseling programs, and collaborate with all key stakeholders, including classroom teachers, school administrators, parents, and community members, to ensure the academic, personal-social, and college-career development of students.

The Ph.D. degree is offered in two areas of specialization: Counseling Psychology (in collaboration with the Psychology Department) and School Psychology. Doctoral studies prepare students to achieve exceptional competence in the theory and practice of their field; to develop a high level of skills as researchers, educators and administrators; and to assume positions of leadership in relevant settings. Students in the specialization of Counseling Psychology are prepared to work as researchers, educators, psychologists, and

supervisors in such settings as academic departments, college and university counseling centers, and community mental health agencies. Doctoral-level school psychologists serve as researchers, university faculty, supervisors, administrators, and advanced level practitioners. Program accreditation within CoPE includes: The School Psychology and Counseling Psychology doctoral programs are accredited by the American Psychological Association (APA). The School Psychology doctoral program is approved by the National Association of School Psychologists (NASP), and is also approved for certification by the Maryland State Department of Education. The School Counseling masters program is approved by the Maryland State Department of Education.

Note that, since 2012, the CoPE graduate programs have been part of a new department, the Department of Counseling, Higher Education, and Special Education. The CoPE programs were previously housed in the Department of Counseling and Personnel Services.

The **School Psychology** (http://www.education.umd.edu/CHSE/academics/specialization/SchoolPsychology.html) Program is an APA-accredited, research-intensive Ph.D. program in professional psychology that embodies the scientist-practitioner model. Program graduates pursue academic/research- and practice-oriented careers. Graduates of the Program are eligible for licensure as professional psychologists in Maryland and other states, and are also eligible for the Nationally Certified School Psychologist credential awarded by NASP. Graduates are automatically eligible for Maryland State Dept. of Education certification as a School Psychologist.

Financial Assistance

The Department of Counseling, Higher Education, and Special Education offers graduate research, teaching, and administrative assistantships on a selective basis to doctoral students. The Department also assists its students in finding assistantship placements with a variety of on-campus and off-campus units. In addition, a small number of new Ph.D. students are offered highly selective fellowships funded jointly by the Department and the University.

Contact

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Website: http://www.education.umd.edu

Courses: EDCP

Admissions

General Requirements

- Statement of Purpose: Statement of Purpose needs to be the goals and objectives in relation to those of the program.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationcosp.pdf)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Dec
International Applicants:	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Dec

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- School Psychology, Certificate of Advanced Study (C.A.S.) (p. 370)
- School Psychology, Doctor of Philosophy (Ph.D.) (p. 370)
- School Psychology, Master of Arts (M.A.) (p. 370)

Facilities and Special Resources

All master's, A.G.S., and doctoral students are required to include supervised fieldwork experiences in their degree programs. The CoPE programs have excellent cooperative relationships with on-campus facilities, such as the Counseling Center and Health Center. Fieldwork may also be done at a wide variety of school systems, colleges and universities, and counseling services and mental health agencies in the Baltimore/Washington metropolitan area, or nationally.

In addition to campus and program resources, students utilize the many major research and professional institutions that are easily accessible to the campus. These include the Library of Congress, the National Library of Medicine, the National Institutes of Health, the Institute of Education Sciences, professional associations such as the American Counseling

Association, the American Psychological Association, and the National Association of School Psychologists.

School Psychology, Certificate of Advanced Study (C.A.S.)

The A.G.S. certificate is offered in some of the CoPE areas of specialization. For individuals who hold a master's degree in counseling or a closely related field, this certificate program may serve:

1. to provide the additional education required for professional certification or licensure in those specialty areas that require a program of two year's length, and/or
2. to provide the academic background for an advanced level of professional practice within a specialty area.

Those interested in the AGS should contact the program *before* applying.

School Psychology, Master of Arts (M.A.)

Students pursing doctoral degrees may earn the M.A. with thesis within the doctoral program while progressing to the Ph.D. Please contact your advisor for more information.

School Psychology, Doctor of Philosophy (Ph.D.)

Ph.D. students are expected to attain advanced skills as both practitioners and researchers in their area of specialization. All doctoral students are required to take advanced courses in statistics and research design. Because of the highly specialized nature of each of the doctoral programs, applicants should consult the web page for specific areas of specialization. These pages describe specific course and fieldwork requirements, the nature of the comprehensive examination required for completion of the program, and the dissertation requirements.

The Doctoral program in School Psychology requires the completion of 104 credits, including 12 credits of EDCP899. Included in the 104 credit requirement, students should take one course in each of the following areas for a total of 24 credits:

1. Developmental Psychology
2. Biological Aspects of Behavior
3. Cognitive Psychology
4. Social Aspects of Behavior
5. History and Systems of Psychology
6. Assessment Foundations
7. Research Design
8. Cultural and Individual Diversity.

Course	Title	Credits
Required courses:		
EDCP789	Advanced Topics in Counseling and Personnel Services (EDCP789Q - Developmental Psychopathy)	3
EDMS646	General Linear Models I	3
EDMS651	General Linear Models II	3
EDCP632	Cognitive Assessment	3
EDCP799	Master's Thesis Research	6
EDCP633	Diagnostic Appraisal of Children I	3
EDCPxxx	Academic Assessment	1
EDCP738	Practicum in Child Assessment	6
EDCP630	School-Based Behavioral Interventions	3
EDCP789	Advanced Topics in Counseling and Personnel Services (EDCP789Z - Consultation)	3
EDCP635	School Consultation I	3
EDCP789	Advanced Topics in Counseling and Personnel Services (EDCP789N - Therapeutic Approaches with Children)	3
EDCP789	Advanced Topics in Counseling and Personnel Services (EDCP789B - Theories and Methods of Intervention)	3
EDCP618	Counseling Skills: Introduction to Practicum	1
EDCP651	Group Counseling in Schools	3
or EDCP617	Group Counseling	
EDCP640/641	School Psychology Seminar: Overview of the Specialty	3
EDCP888	Apprenticeship in Counseling and Personnel Services (EDCP888C - Field Work)	6
Clinical Supervision course		3
EDSPxxx	Special Education Elective	3
EDCP889	Internship in Counseling and Personnel Services	6
Select one course in each of the following areas:		24
Developmental Psychology		
Biological Aspects of Behavior		
Cognitive Psychology		
Social Aspects of Behavior		
History and Systems of Psychology		
Assessment Foundations		
Research Design		
Cultural and Individual Diversity		
Dissertation Research Requirements		
EDCP899	Doctoral Dissertation Research	12
Total Credits		104

School System Leadership (EDUC)

Graduate Degree Program
College: Education

Abstract

The program is administered at the College of Education level as it involves faculty from across the college. Students are required to have a Master's degree as well as Administrator I Certification. This is a closed cohort program offered in collaboration with local school systems. The degree requires 90 credits, of which 60 must be taken in the program and the remaining 30 must be from a previously earned Master's degree.

Website: http://www.education.umd.edu

Admissions

Please contact your department for admissions information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- School System Leadership, Doctor of Education (Ed.D.) (p. 371)

School System Leadership, Doctor of Education (Ed.D.)

Students are required to complete 90 credits, of which 60 must be taken in the program and the remaining 30 must be from a previously earned Master's degree.

Course	Title	Credits
Required courses:		
EDUC701	Applied Research and Data Based Decision Making for School Leaders	3
EDUC702	Applied Research Design for Education Leaders	3
EDUC703	Conducting Library Research for Dissertations	2
EDUC704	Introduction to Writing the Dissertation in Practice	2
EDUC705	Education Policy Making and the School Leader	4
EDUC740	Managing Educational Organizations in a Diverse Society	4
EDUC747	Advanced Seminar on Instructional Improvement for School Leaders	4
EDUC760	The Human Dimension in Administration	4
EDUC767	Seminar on School District Leadership	4
EDUC769	System Innovation and Transformation	4
EDUC888	Applied Apprenticeship in Education	8
EDUC898	Pre-Candidacy Research	6
Master's Degree courses		30
Dissertation Research Requirements		
EDUC899	Dissertation of Practice Research	12
Total Credits		90

Scientific Computation (Z014)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The certificate program is designed to give graduate students in other departments an opportunity to study modern computational methods and at the same time give them recognition for their extra efforts.

Website: http://www.amsc.umd.edu

Admissions

This certificate is only available to students who are enrolled in a graduate degree program at the University of Maryland, College Park campus. Please contact your department for admissions information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.amsc.umd.edu

Requirements

- Scientific Computation, Post-Baccalaureate Certificate (P.B.C.) (p. 371)

Scientific Computation, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
AMSC660	Scientific Computing I	3
AMSC661	Scientific Computing II	3
AMSC662	Computer Organization and Programming for Scientific Computing	3
Select one applications course		3
Total Credits		12

Second Language Acquisition (SLMA)

Graduate Degree Program
College: Arts and Humanities

Abstract

The M.A. is intended primarily as a two-year program for full-time students. A very limited number of part-time students would also be admitted. It will provide students with rigorous, comprehensive training in the theory and research of second (including foreign) language learning, teaching and testing, and related areas. A major program focus includes preparation for those working, or intending to work, in programs for tertiary students and adults studying less commonly taught languages (LCTLs), e.g., East-Asian and Middle-Eastern languages, and such modern European languages as Spanish, French, Italian and German. Areas of particular faculty expertise include cognitive processes in SLA; language teaching methodology and pedagogy; psycholinguistics; language processing; individual differences in such factors as age, aptitude, and

working memory; second language analysis; interlanguage studies; heritage learners; needs analysis; syllabus design; materials writing; learner training; language assessment; program evaluation; second language research methods; task-based language teaching; and uses of technology in language learning and testing.

Financial Assistance

Masters Degree and Certificate students in the College of Arts and Humanities are rarely offered funding. It is expected that students admitted to the SLA M.A. or Certificate Program will come with outside sponsorship.

Contact

Steven J. Ross, Ph.D.
Director of SLA Program
School of Languages, Literatures, and Cultures
3215 Jimenez Hall
4125 North Library Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.4246
Fax: 301.314.9752
Email: sross@umd.edu

Website: http://www.sllc.umd.edu

Courses: COMM EDCI EDHD EDMS HESP LING PHIL PSYC SLAA

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE): The GRE is required of all native speakers of English and recommended for non-native speakers.

Students may enter the program in the Fall semester only. Prior to admission to the program, applicants must have successfully completed a Bachelors degree from an accredited university in a relevant field, e.g., linguistics, applied linguistics, psychology, foreign languages, applied linguistics, cognitive science, anthropology or education.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	16 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	1 Feb

Other Deadlines: Please visit the program website at http://www.sllc.umd.edu

Requirements

- Second Language Acquisition, Master of Arts (M.A.) (p. 372)

Facilities and Special Resources

In addition to the University graduate library, the SLA program offers research facilities and resources to facilitate research and materials development, including a multimedia SLA Lab, the Language House (http://www.languages.umd.edu/lh), The Center for Innovative Teaching and Learning (http://sllc.umd.edu/citl), the Office of Information Technology (http://www.oit.umd.edu), and the Center for Teaching Excellence (http://www.cte.umd.edu).

Students completing coursework with affiliate faculty in the Departments of Psychology, Communication (http://www.comm.umd.edu), Linguistics (http://www.ling.umd.edu), and Education (http://www.education.umd.edu) as well as the Center for Advanced Study of Languages (http://www.casl.umd.edu) may have access to their respective resources.

Second Language Acquisition, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

The M.A. in SLA is a 30-credit program, with two tracks: Plan A, by coursework and thesis, and Plan B, by coursework only. These two tracks are meant to accommodate two slightly different populations, those planning on going on for the Ph.D. at Maryland or elsewhere (Plan A) and those who will be consumers and interpreters rather than producers of research and for whom the M.A. will be a terminal degree (Plan B). A Certificate in SLA will also be offered. The Certificate requires 18 credit hours of course work from the Plan B curriculum.

Course	Title	Credits
Required courses:		
SLAA610	Research and Theories in Second Language Acquisition	3
SLAA611	Fundamentals of Foreign Language Acquisition and Instruction	3
SLAA630	Second Language Testing	3
SLAA640	Psycholinguistics	3
SLAA650	Second Language Analysis	3
SLAA620	Second Language Research Methodologies	3
Thesis or Non-Thesis Requirements		12
Thesis:		
Select 6 credits of approved electives		
SLAA799	Master's Thesis Research	
Non-Thesis:		

Select 12 credits of approved electives	
Total Credits	30

Second Language Acquisition (SLPH)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Ph.D. program in SLA at the University of Maryland aims to train students to conduct research on second language acquisition processes. It has a strong cognitive focus. The program draws upon the expertise of a distinguished cadre of faculty in the School of Languages, Literatures and Cultures (http://www.languages.umd.edu), and in affiliate departments such as Human Development, Linguistics (http://ling.umd.edu/); Measurement, Statistics, and Evaluation (http://www.education.umd.edu/EDMS); Hearing and Speech (http://www.bsos.umd.edu/hesp); Philosophy (http://www.philosophy.umd.edu); Psychology (http://www.bsos.umd.edu/psyc); and Curriculum and Instruction (http://www.education.umd.edu/EDCI)

Financial Assistance

Most students admitted to the Ph.D. program will be funded, either via graduate or teaching assistantships or via research assistantship on grants and contracts, all providing tuition waiver plus stipend. Some students may receive a Graduate Assistantship from the UMCP-affiliated Center for the Advanced Study of Language (CASL) (http://www.casl.umd.edu) or the National Foreign Language Center (NFLC (http://www.nflc.org), a unit within the College of Arts and Humanities (ARHU).

Contact

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Website: http://www.sllc.umd.edu

Courses: COMM EDCI EDHD EDMS HESP LING PHIL PSYC SLAA

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- Writing Sample: Demonstrated evidence of ability and interest in undertaking scholarly research; could be published paper or M.A. thesis.
- Interview may be required (in-person/by phone)

Please consult the program's web site (http://www.languages.umd.edu/SLAA) for more information.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	16 Jan	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	1 Feb	28 Sep

Other Deadlines: Please visit the program website at http://www.sllc.umd.edu

Requirements

- Second Language Acquisition, Doctor of Philosophy (Ph.D.) (p. 373)

Facilities and Special Resources

In addition to the University graduate library, the SLA program offers research facilities and resources to facilitate research and materials development, including a multimedia SLA Lab, the Language House (http://www.languages.umd.edu/lh), The Center for Innovative Teaching and Learning (http://sllc.umd.edu/citl), the Office of Information Technology (http://www.oit.umd.edu), and the Center for Teaching Excellence (http://www.cte.umd.edu).

Students completing coursework with affiliate faculty in the Departments of Psychology, Communication (http://www.comm.umd.edu), Linguistics (http://www.ling.umd.edu), and Education (http://www.education.umd.edu) as well as the Center for Advanced Study of Languages (http://www.casl.umd.edu) may have access to their respective resources.

Second Language Acquisition, Doctor of Philosophy (Ph.D.)

Doctoral students are required to take 3 credits of SLAA649 (SLAA649R - Research Critique) within their first year. In addition, students choose two courses from two different specializations for a total of 4 courses. Specializations available include Second Language Learning, Second Language Instruction, Second Language Measurement and Assessment, and Second Language Use. Students are also required to complete 2 courses in quantitative and/or qualitative research methods, as well as 12 credits of SLAA899.

The Ph.D. has 4 areas of specialization: **Second Language Learning, Second Language Instruction, Second Language Measurement and Assessment,** and **Second Language Use**. Students select 2 courses each from 2 of these areas (for a total of 4 courses) and are expected to take 2 additional electives in the area of their proposed dissertation work. In addition, all students are expected to take 2 courses in quantitative and/or qualitative research methods. The 8 courses (total) represent the minimum coursework requirement. Some students may need remedial coursework prior to undertaking their 8 courses, and many will wish to take courses beyond the minimum 8 based on their interests. Additionally, all students are strongly encouraged to take a course in the philosophy of science. Before graduation, all students completing the PhD in Second Language Acquisition must demonstrate three types of experience with non-native language: learning a non-native language, using a non-native language, and teaching a language to non-native speakers of that language. All three types of experience will be verified through official documentation and/or assessment as follows:

1. Language Learning. Students must have spent at least two semesters as a student of a non-native language in a post-secondary classroom environment (6 total credits minimum). Verified through transcript. SLLC will provide this experience for any student who needs it.
2. Language Teaching. Students must have taught a language to non-native speakers of that language for at least 1 semester, or the equivalent of 45 hours. Verified through contract, letter, etc. SLLC will provide this experience for any student who needs it.
3. Language use. Students must show that they are able to communicate in a non-native language at the intermediate-low level on the ACTFL scale through an Oral Proficiency Interview (OPI). Students whose native language is not English will be able to satisfy this requirement through their competency in English. These three requirements do not necessarily have to be met in the same language. Before the PhD dissertation, two qualifying papers are required. Please see the program website (http://www.languages.umd.edu/slaa) for more details.

Course	Title	Credits
Core Requirements		
SLAA649	Special Topics in Second Language Acquisition (SLAA649R - Research Critique)	3
Complete 2 courses in quantitative and/or qualitative research methods		6
Specialization Requirements		
Select 2 courses each from 2 of these areas		12
Second Language Learning		
Second Language Instruction		
Second Language Measurement and Assessment		
Second Language Use		
Dissertation Research Requirements		
SLAA899	Doctoral Dissertation Research	12
Total Credits		33

Second Language Acquisition (Z081)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The M.A. is intended primarily as a two-year program for full-time students. A very limited number of part-time students would also be admitted. It will provide students with rigorous, comprehensive training in the theory and research of second (including foreign) language learning, teaching and testing, and related areas. A major program focus includes preparation for those working, or intending to work, in programs for tertiary students and adults studying less commonly taught languages (LCTLs), e.g., East-Asian and Middle-Eastern languages, and such modern European languages as Spanish, French, Italian and German. Areas of particular faculty expertise include cognitive processes in SLA; language teaching methodology and pedagogy; psycholinguistics; language processing; individual differences in such factors as age, aptitude, and working memory; second language analysis; interlanguage studies; heritage learners; needs analysis; syllabus design; materials writing; learner training; language assessment; program evaluation; second language research methods; task-based language teaching; and uses of technology in language learning and testing.

CONTACT

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Email: sross@umd.edu

Website: http://www.sllc.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- Graduate Record Examination (GRE)

Students may enter the program in the Fall semester only. Prior to admission to the program, applicants must have successfully completed a Bachelors degree from an accredited university in a relevant field, e.g., linguistics, applied linguistics, psychology, foreign languages, applied linguistics, cognitive science, anthropology or education.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	16 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	1 Feb

Other Deadlines: Please visit the program website at http://www.sllc.umd.edu

Requirements

- Second Language Acquisition, Post-Baccalaureate Certificate (P.B.C.) (p. 375)

Facilities and Special Resources

In addition to the University graduate library, the SLA program offers research facilities and resources to facilitate research and materials development, including a multimedia SLA Lab, the Language House (http://www.languages.umd.edu/lh), The Center for Innovative Teaching and Learning (http://sllc.umd.edu/citl), the Office of Information Technology (http://www.oit.umd.edu), and the Center for Teaching Excellence (http://www.cte.umd.edu).

Students completing coursework with affiliate faculty in the Departments of Psychology, Communication (http://www.comm.umd.edu), Linguistics (http://www.ling.umd.edu), and Education (http://www.education.umd.edu) as well as the Center for Advanced Study of Languages (http://www.casl.umd.edu) may have access to their respective resources.

Second Language Acquisition, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Required courses:		
SLAA610	Research and Theories in Second Language Acquisition	3
SLAA611	Fundamentals of Foreign Language Acquisition and Instruction	3
SLAA620	Second Language Research Methodologies	3
SLAA630	Second Language Testing	3
Select two approved electives		6
Total Credits		18

Sociology (SOCY)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Graduate Program in Sociology is designed for students seeking a Ph.D. degree. However, the M.A. option is available to students who either wish to obtain a master's degree while continuing in the Ph.D. program, or who leave the program before finishing the PhD. Areas of emphasis in the Department include: demography; development; gender, work, and family; globalizing theory; military sociology; social psychology; and stratification.

Typically, about half the students finishing Ph.D. degrees in the Sociology Department work as faculty members at colleges and universities, and about half are working in research, administration, and consulting in federal, state, or private organizations. Our location in the Washington, D.C., area offers an unusual number of full-time research opportunities for our graduates.

Financial Assistance

Financial assistance for graduate students is available through teaching and research assistantships, and for advanced students through part-time instructorships. We also have several special fellowships for outstanding applicants that provide additional support tailored to the applicants needs. All carry a stipend plus tuition remission, and most include health benefits.

Contact

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Website: http://www.socy.umd.edu

Courses: SOCY

Keywords : Demography; Gender, Work, and Family; Military Sociology; Development; Stratification; Social Psychology; Globalizing Theory; Sociology UMD; University of Maryland Department of Sociology

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE): Ph.D. only
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationsocy.pdf) (Ph.D. only)
- Writing Sample (Ph.D. only): Limited to 35 pages with references, tables, and figures.

Please note, the Master's program is for current University of Maryland undergraduates only. Any UMD applicant needs to have SAT scores of verbal plus math scores totaling at least 1270. In addition he/she subject to an academic audit by the Academic/Departmental Advisor.

Admission to the graduate program is based upon the student's academic record, GRE scores, letters of recommendation, and other information relevant to the applicant's chances of being successful in the program. Although a previous major in Sociology is not required, students entering the graduate program should have had the following in undergraduate courses: mathematics through college algebra, elementary statistics, sociological theory, and sociological research methods. Students who have completed prior graduate coursework in Sociology may petition to waive one or more courses in Social Theory, Statistics, or Research Methods. New graduate students are assigned temporary advisors upon arrival, and are then expected to select a permanent advisor who will direct their dissertation research. For consideration for departmental fellowships or assistantships, applications should be received by the preferred deadlines.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.socy.umd.edu

Requirements

- Sociology, Doctor of Philosophy (Ph.D.) (p. 376)
- Sociology, Master of Arts (M.A.) (p. 376)

Facilities and Special Resources

In addition to these programs, the department is closely involved with the following research centers: the Center for Research on Military Organization, the Maryland Population Research Center (MPRC), the Center for Innovation, and the Program for Society and the Environment. Collectively, these centers account for over five million dollars in annual research funding. The Department is also affiliated with an interdisciplinary Joint Program on Survey Methods (JPSM). The campus has excellent computer facilities and computer resources are available to faculty and graduate students.

Sociology, Master of Arts (M.A.)

The graduate program in the Department of Sociology is designed for Ph.D. students. We do not offer a terminal Masters program and we will not accept or enroll students for the single purpose of acquiring a Masters degree. However, doctoral students may obtain a Master of Arts degree during their course of doctoral study by completing 30 credit hours.

Course	Title	Credits
Required courses:		
SOCY620	Development of European and American Sociological Theory	3
SOCY601	Statistics For Sociological Research I	3
SOCY602	Statistics For Sociological Research II	3
SOCY699	Special Social Problems (SOCY699D - Special Social Problems)	3
SOCY699	Special Social Problems (SOCY699C - Special Social Problems)	1
SOCY616	Sociology Pro-Seminar	1
Select one course in proposal development		3
Complete an original research paper in the fourth semester		3
Remainder of coursework		10
Total Credits		30

Sociology, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete a total of 56 credits including 12 credits of SOCY899. In addition, students must complete a Second-Year Research Paper and pass two specialty exams.

After completion of the coursework, doctoral students must pass two examinations qualifying them to write their dissertations in the specialties of their choice. Upon the recommendation of the appropriate faculty members, the Department Graduate Committee approves the coursework qualifying students to take the two examinations.

Course	Title	Credits
Required courses:		
SOCY616	Sociology Pro-Seminar	1
SOCY620	Development of European and American Sociological Theory	3
SOCY601	Statistics For Sociological Research I	3
SOCY602	Statistics For Sociological Research II	3
SOCY699	Special Social Problems (SOCY699D - Special Social Problems)	3
SOCY699	Special Social Problems (SOCY699C - Special Social Problems)	1
Select one Social Theory course		3
Select an additional Research Methods course		3
Select one Advanced statistic course or research methods course		3
Select one Statistical Techniques course		3
Specialization Requirements		

Select 18 credits of specialization courses		18
Dissertation Research Requirements		
SOCY899	Doctoral Dissertation Research	12
Total Credits		56

Software Engineering (PMES)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Software Engineering program is concerned with developing and maintaining software systems that behave reliably and efficiently, are affordable to develop and maintain, and satisfy all the requirements that customers have defined for them. Our faculty consists of world class researchers and practitioners who apply the latest Software Engineering principles at large projects at NASA, DARPA, Raytheon, and Lockheed Martin. Courses focus on three technical areas—cybersecurity, computer engineering, and systems engineering—preparing students to help solve pressing real-world problems.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/software.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Software Engineering, Master of Engineering (M.Eng.) (p. 378)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art

chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Software Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENPM611	Software Engineering	3
ENPM612	System and Software Requirements	3
ENPM613	Software Design & Implementation	3
ENPM614	Software Testing & Maintenence	3
ENPM696	Reverse Software Engineering	3
ENPM808	Advanced Topics in Engineering (ENPM808E - Managing Software Engineering Projects)	3
Select electives approved by advisor		12
Total Credits		30

Software Engineering (Z065)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our programs in Software Engineering program is concerned with developing and maintaining software systems that behave reliably and efficiently, are affordable to develop and maintain, and satisfy all the requirements that customers have defined for them. Our faculty consists of world class researchers and practitioners who apply the latest Software Engineering principles at large projects at NASA, DARPA, Raytheon, and Lockheed Martin. Courses focus on three technical areas—cybersecurity, computer engineering, and systems engineering—preparing students to help solve pressing real-world problems.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Office of Advanced Engineering Education
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4356 Stadium Drive
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College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/software.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Software Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 379)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Software Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses;		
ENPM611	Software Engineering	3
ENPM612	System and Software Requirements	3
ENPM613	Software Design & Implementation	3
ENPM614	Software Testing & Maintenence	3
Total Credits		12

Spanish Language and Literature (SPAP)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Faculty of the Department of Spanish and Portuguese is committed to excellence in teaching and mentoring, along with the production of new knowledge that is the hallmark of a strong department. We are known for our focus on intersections between language, literature, culture, and politics, our community engagement, and our MA track in Hispanic Applied Linguistics. We bridge several intellectual fields across Spain and Spanish America and between North, Central and South America, the Caribbean, and Brazil, as we rethink the specificity of our cultures. The Department has been the home of major Latin American and Spanish literary figures, to include Juan Ramon Jimenez, who taught at the University between 1943 and 1951 and who, after being nominated by the Department, received the Nobel Prize for Literature in 1956. His legacy, as well as that of cultural critic Angel Rama, award-winning poet Jose Emilio Pacheco, award winning writer and Professor Emeritus, Jorge Aguilar Mora, and Professor Emerita, Graciela Palau de Nemes, among others, continues to shape our thought, vision, and mission.

The Department is renowned for its multidisciplinary strengths in Latin American and Lusophone literatures and cultures as well as its faculty research in the areas of the history of ideas, Southern Cone literature, Judeo-Latin American literature, Mexican literature, theater, and performance, Latin American modernismo, colonial and transatlantic discourses, Central American transnational cultures, U.S. Latinidades, Quechua language and indigenous literatures, Caribbean-Archipelagic poetics/politics, salsa and sabor, Brazilian cinema, Lusophone Africa and African diaspora studies, deconstruction of the Cuban Revolution, and contemporary reinscriptions of the nineteenth century.

Faculty members in the area of Spanish literature are recognized for their work in the history of the Spanish language and philology from the Middle Ages to the present, Medieval historiography and women narratives, Golden Age poetics, Cervantes and Quevedo traditions, revisions of the Enlightenment, romanticism (journalism and costumbrismo) and realism (philosophical traditions), modern and postmodern narrative and poetics, as well as representations of the Spanish Civil War and exile, particularly in Latin America.

The Department is also at the forefront of Spanish Applied Linguistics, language teaching pedagogy, language teacher education, language use and identity, social and political issues in foreign language teaching and learning, instructional technology, learner variables and learning disabilities, language for specific purposes, cross-cultural communication, and heritage language learning.

Mission

The Department of Spanish and Portuguese seeks to forge a strong dialogue between, and within, our areas of specialization pertaining to Latin America, Spain, and Portugal. To that end, we offer thorough instruction in the diverse, complex, and globalized literatures, cultures, and linguistics of the Spanish and Portuguese-speaking world. Our

students not only develop the critical language skills to communicate in the target language but also gain an understanding of the cultures, politics, histories, and literatures of the communities and national spaces of the Americas, Spain, and Portugal.

Our goal is to foster learning and thought, develop critical perspectives, and promote intellectual growth in our students. We teach across interdisciplinary fields such as literature, film, popular and visual culture, theatre, history, philosophy, critical theory, gender and queer studies, philology, and linguistics in different cultural and geographic contexts. We strive for the creation and discussion of new forms of knowledge and the effective engagement of our students and faculty with the world. We prepare students to become promising professionals in their chosen careers.

Our M.A. and Ph.D. graduates are mentored by our faculty, engage in substantive research projects, and benefit from rigorous training in the teaching skills required by the profession. They are prepared to meet the professional demands of highly competitive academic positions in the United States and Latin America.

Financial Assistance

Financial assistance in the form of fellowships and assistantships is available for qualified applicants.

Contact

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Website: http://sllc.umd.edu/spanish

Courses: PORT SPAN

Keywords: Spanish in Maryland; Spanish in Washington, DC; PhD in Spanish; MA and PhD in Spanish; MA and PhD in Spanish/Peninsular literature; applied linguistics; Latin American Literature, MA and PhD in Latin American Literature

Relationships: American Studies (AMST) (p. 34) **Comparative Literature (CMLT)** (p. 135) **English Language and Literature (ENGL)** (p. 185) **Second Language Acquisition (SLPH)** (p. 371) **Theatre and Performance Studies (THPF)** (p. 412) **Women's Studies (WMST)** (p. 426)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s): Minimum 12 credits upper level literature/culture courses.
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Graduate Record Examination (GRE)
- 3 Letters of Recommendation: The letters of recommendation must be in English or notarized translation.
- Writing Sample: A research paper written in Spanish, uploaded to the Upload Requirements section of the application.
- Interview may be required (in person/by phone)

In addition to Graduate School requirements, candidates must have a bachelor's degree with a major in Spanish Language and Literature, or the equivalent in a related field with near native fluency in the written and spoken language.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Preferred: 10 Jan / Final: 16 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Preferred: 10 Jan / Final: 16 Jan

Other Deadlines: Please visit the program website at http://sllc.umd.edu/spanish

Requirements

- Spanish Language and Literature, Doctor of Philosophy (Ph.D.) (p. 381)
- Spanish Language and Literature, Master of Arts (M.A.) (p. 381)

Facilities and Special Resources

In addition to the resources of the University libraries, students have easy access to the Library of Congress, the Smithsonian Institution and other Washington-based libraries and archives. National Archives-II, located on University grounds, is readily accessible to the Campus community. Dr. Sosnowski is the founder and editor of the literary journal Hispamerica. The graduate students publish Animal de fondo.

In association with the Latin American Studies Center, the Department promotes original initiatives on Latin American topics. Postdoctoral Fellows and Visiting Professors are an integral part of our academic program. Also the Department hosts Juan Ramón Jiménez Distinguished Lectures and Seminars Series and the José Emilio Pacheco Distinguished Series. In recent years, our faculty has been the recipient of major grants and fellowships from The Rockefeller Foundation, the National Endowment for the Humanities and the John Simon Guggenheim Foundation.

Spanish Language and Literature, Master of Arts (M.A.)

Thesis or Non-thesis option: 30 credits

Students can specialize in either Spanish Literature, Latin American Literature, or Hispanic Applied Linguistics. For either option, students must also pass three comprehensive exams and pass a language exam. All students must submit a scholarly paper in their final semester of the program.

The Department offers three areas of specialization within the 30-credit MA: Spanish literature, Latin American literature, and Hispanic applied linguistics. All areas offer a non-thesis option and a thesis option, and all include a comprehensive examination. A one-credit course in methodology is required of all teaching assistants.

See the website of the Department of Spanish and Portuguese for more details: http://sllc.umd.edu/spanish/graduate.

Spanish Literature track

Course	Title	Credits
Core Requirements		
Linguistics course		3
Literary theory and/or criticism course		3
Non-major literature courses		9
Thesis or Non-Thesis Requirements		
Select one of the following options:		15
Non-Thesis:		
Select 15 credits of Spanish Literature		
Thesis:		
Select 9 credits of Spanish Literature		
SPAN799	Master's Thesis Research	
Total Credits		30

LATIN AMERICAN LITERATURE track

Course	Title	Credits
Core Requirements		
Linguistics course		3
Literary theory and/or criticism course		3
Non-major literature courses		9
Thesis or Non-Thesis Requirements		
Select one of the following options:		15
Non-Thesis:		
Select 15 credits of Latin American Literature courses		
Thesis:		
Select 9 credits of Latin American Literature courses		
SPAN799	Master's Thesis Research	
Total Credits		30

Hispanic Applied Linguistics Track

Course	Title	Credits
Core Requirements		
Hispanic Applied Linguistics courses		12
Literature courses		9
Thesis or Non-Thesis Options		
Select one of the following options:		9
Non-Thesis:		
SPAN798	Open Seminar	
Select 6 credits of Electives		6
Thesis:		
SPAN799	Master's Thesis Research	
Select 3 credits of Electives		
Total Credits		36

Spanish Language and Literature, Doctor of Philosophy (Ph.D.)

The doctoral degree is a research and specialized degree and the Graduate School does not require a fixed number of credit hours. However, the Department of Spanish and Portuguese requires a total of 36 credits. Before admission to candidacy, the student must demonstrate:

1. a thorough knowledge of the literary production in the chosen area (Spanish or Spanish-American Literature);
2. an in-depth knowledge of the field of specialization;
3. proficiency in at least one field of the others Hispanic literatures;
4. a reading knowledge of a language other than Spanish and English, to be used as a research tool in the field of specialization;
5. one course in linguistics, such as 'History of the Spanish Language';
6. a minimum of one course in Literary Theory and/or Criticism;
7. acquaintance with a third literature (e.g. Luso-Brazilian, French, or English); and
8. a background in supporting fields to be used as research tools (e.g. history, philosophy, political science, sociology, or art). Students must pass a comprehensive examination, a translation exam (in a language other than English and Spanish), have their dissertation proposal approved for admission to candidacy, and defend a dissertation.

Doctoral students are required to complete 36 credits of coursework in addition to 12 credits of SPAN899. Students must also pass the comprehensive exam, a language reading exam, and the dissertation proposal and defense.

Course	Title	Credits
Core Requirements		
Select 36 credits of coursework including:		36
Two courses in a secondary area		
A graduate course in the History of the Spanish Language		
A minimum of one course in literary theory and/or criticism		
Dissertation Research Requirements		

SPAN899	Doctoral Dissertation Research	12
Total Credits		48

Special Education (EDSP)

Graduate Degree Program
College: Education

Abstract

Graduate programs in special education are designed to prepare highly qualified teachers, to provide graduate level content, and to prepare researchers, teacher educators, and leaders in the field of special education. We offer the following graduate program options:

- M.Ed. in Special Education with Generic Elementary/Middle age based certification
- M.Ed. in Special Education with Generic Elementary/Middle age based and severe disabilities certification
- M.Ed. in Special Education with severe disabilities certification only
- M.Ed. in Specialty Program (30 credits)
- M.A. in Special Education (36 credits)
- Advanced Graduate Specialist Certificate (30 credits beyond the master's degree) (p. 383)
- Ph.D. program

Note that, as of 2012, the EDSP graduate programs are part of a new department, the Department of Counseling, Higher Education, and Special Education. The EDSP degree programs were previously housed in the Department of Special Education.

Financial Assistance

A limited number of fellowships, assistantships and/or grants are available to qualified applicants.

Contacts

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Website: http://www.education.umd.edu/CHSE/SE_overview.html

Courses: EDSP

Admissions

- M.A. and Ph.D. admissions requirements (https://gradschool.umd.edu/education/edsp-ma-phd)
- M.Ed. admissions requirements (https://gradschool.umd.edu/education/edsp-med)

For the M.Ed. programs, students must submit scores on the Praxis Core Academic Skills for Educators test (meeting the State of Maryland passing scores) prior to admission into the program and have an undergraduate 3.0 GPA. The Master's of Arts program requires a 3.0 undergraduate GPA and the submission of the Miller Analogies Test or the Graduate Record Examination test scores at or above the 40th percentile rank. The AGS program requires a 3.0 undergraduate GPA, a master's GPA of 3.5, and submission of scores on the MAT, GRE, or Praxis Core Academic Skills for Educators test. Admission to the Ph.D. program requires:

1. Master's degree or equivalent in Special Education or a related field from an accredited institution with a GPA of 3.5 or better;
2. An undergraduate GPA of 3.0 or better;
3. A score on the Graduate Record Exam placing the student at or above the 50th percentile on verbal, quantitative, and analytic subtests;
4. Two years of research or work experience with exceptional populations;
5. Three letters of recommendation from individuals who have direct knowledge of the applicant's academic capabilities, work experience, and professional characteristics;
6. A statement of academic and research goals including intended area of study, research interests, and plans for future employment;
7. Evidence of writing skills shown in the statement of academic and research goals;
8. EDMS Research Methods I or equivalent.

Students pursuing teacher certification in special education are required to take courses required by the Maryland State Department of Education which lead to certification in the State of Maryland. Programs for the Master's specialty program, the AGS, and the Ph.D. are planned individually by the students and advisor to reflect each student's background and goals.

A TOEFL score of 100 is required for international students who are not native speakers of English.

1. GRE for Ph.D., Miller Analogies or GRE for M.A., Praxis Core Academic Skills for Educators for M.Ed., MAT, GRE or Praxis Core Academic Skills for Educators for A.G.S. (at State of Maryland cut scores)
2. Three Letters of Recommendation
3. Statement of Goals
4. Transcripts from all previously attended colleges and universities
5. Interview required for Ph.D. and M.Ed. with teacher certification

See http://www.education.umd.edu/CHSE/admissions/admission_criteria/ for more detailed information.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	M.Ed. (with Certification): 5 Mar
	M.Ed. (without Certification): 14 June
	M.A. or Ph.D. Preferred: 4 Dec / Final: 5 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	M.Ed. (with Certification): 5 Mar

	M.Ed. (without Certification): 5 Mar
	M.A. or Ph.D. Preferred: 4 Dec / Final: 5 Feb

Other Deadlines: Please visit the program website at http://www.education.umd.edu/CHSE/SE_overview.html

Requirements

- Special Education, Certificate of Advanced Study (C.A.S.) (p. 383)
- Special Education, Doctor of Philosophy (Ph.D.) (p. 384)
- Special Education, Master of Arts (M.A.) (p. 383)
- Special Education, Master of Education (M.Ed.) (p. 383)

Facilities and Special Resources

The Special Education program provides an unparalleled setting for graduate study. The program's proximity to outstanding public schools in Maryland provides students who wish to pursue teacher certification the chance to gain experience with a culturally and linguistically diverse student population in urban, suburban, and rural settings.

Additionally, students pursuing a doctoral degree can have experiences in advocacy and professional organizations, government agencies, including the US Department of Education in addition to the coursework they take at the University.

Special Education, Certificate of Advanced Study (C.A.S.)

The Certificate of Advanced Study (https://academiccatalog.umd.edu/graduate/programs/special-education-z905) in Special Education is available to students who wish to take graduate courses beyond the master's degree. The minimum number of graduate hours is 60 (of which no more than 30 credits can be applied from another institution). The core of the program consists of special education courses in addition to other coursework within the university as approved by the student's adviser and the special education graduate faculty. The College of Education awards the certificate. http://www.education.umd.edu/CHSE/academics/degree_programs/agsEDSP.html

Special Education, Master of Arts (M.A.)

Thesis option only: 36 credits required

Students enrolled in the master's program in special education may earn the Master of Arts degree which requires a thesis or the Master of Education degree which may or may not include teacher certification.

Students complete the following courses:

Course	Title	Credits
Core Requirements		
EDSP600	Issues and Trends in Educating Individuals with Disabilities	3
EDSP799	Master's Thesis Research	6
Select two of the following:		6
EDMS645	Quantitative Research Methods I	
EDSP670	Single Subject Research Designs	
EDSP671	Qualitative Methodologies in Special Education	
EDSP673	Evaluating Evidence-Based Practices in Special Education	3
or EDSP625	Seminar on Severely Handicapping Conditions	
Remainder of coursework approved by advisor		18
Total Credits		36

Special Education, Master of Education (M.Ed.)

Master of Education Non-Certification Option

The Master of Education Non-Certification option requires 30 credits.

Students complete the following courses:

Course	Title	Credits
Core Requirements		
EDSP600	Issues and Trends in Educating Individuals with Disabilities	3
Select two of the following:		6
EDMS645	Quantitative Research Methods I	
EDSP670	Single Subject Research Designs	
EDSP671	Qualitative Methodologies in Special Education	
EDSP673	Evaluating Evidence-Based Practices in Special Education	3
or EDSP625	Seminar on Severely Handicapping Conditions	
Remainder of coursework approved by advisor		18
Total Credits		30

Master of Education Certification Options

The Master of Education with Certification one-year option requires 38 credits. The two-year option includes Severe Disabilities Teacher Preparation and requires 50 credits.

Regardless of whether students choose the one-year or two-year option, all certification students must complete the following courses:

Course	Title	Credits
Core Requirements		
EDSP470	Introduction to Special Education	3
EDSP443	Language and Literacy Acquisition in Children with Disabilities	3
EDSP613	Behavior and Classroom Management in Special Education	3
EDSP615	Evaluation and Measurement of Exceptional Children and Youth	3
EDSP616	Reading and Writing Instruction in Special Education I	3
EDSP652	Curriculum and Instruction: Elementary Special Education	3
EDSP683	Assessment and Instruction in Mathematics in Special Education	3
EDSP687	Family Partnerships in Special Education	3

EDSP690	Teacher Candidate Research Seminar in Special Education	3
EDSP692	Graduate Internship I: Elementary/Middle Special Education	2
EDSP695	Graduate Internship II: Elementary/Middle Special Education	3
Total Credits		32

Students enrolled in the master's program in special education may earn the Master of Arts degree which requires a thesis or the Master of Education degree which may or may not include teacher certification. http://www.education.umd.edu/CHSE/academics/degree_programs/agsEDSP.html

Special Education, Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy (PhD) degree in Special Education prepares researchers, teacher educators, and leaders who will advance the education of children and adults with disabilities. The program is intended for full-time students and requires a minimum of 60 post-Master's credits in courses that address special education issues and trends, policies, current research and practice as well as research methods and design. Doctoral students will, with their advisor, identify a sequence of courses and experiences to advance their knowledge in an area of specialization. Students pursuing the doctoral program in special education must have completed a Master of Arts degree or the Master of Education degree in special education or a related area. Students should consult the Department website on Graduate Programs for more information. https://education.umd.edu/academics/programs/graduate/special-education-phd

Doctoral students are required to complete 60 credits, including 12 credits of EDSP899. Course requirements are as follows:

Course	Title	Credits
Core Requirements		
Select 5 of the following:		15
EDSP600	Issues and Trends in Educating Individuals with Disabilities	
EDSP675	Legal and Policy Foundations for Individuals with Disabilities	
EDSP798	Special Problems in Special Education (EDSP798x Special Problems in Special Education)	
EDSP872	Theory and Empirical Design in Educational Research	
EDSP888	Apprenticeship in Special Education	
EDSP670	Single Subject Research Designs	
Research Methodology and Design Courses:		
EDMS646	General Linear Models I	3
EDMS651	General Linear Models II	3
Select three additional courses approved with advisor		9
Remaining Coursework:		
EDSP898	Pre-Candidacy Research	3
Electives		15
Dissertation Research Requirements		
EDSP899	Doctoral Dissertation Research	12
Total Credits		60

Special Education (Z905)

Graduate Certificate Program
College: Education

Abstract

The Certificate of Advanced Study in Special Education is available to students who wish to take graduate courses beyond the master's degree. The minimum number of graduate hours is 60 (of which no more than 30 credits can be applied from another institution). The core of the program consists of special education courses in addition to other coursework within the university as approved by the student's adviser and the special education graduate faculty. The College of Education awards the certificate. http://www.education.umd.edu/CHSE/academics/degree_programs/agsEDSP.html

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Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (2)
- Graduate Record Examination (GRE)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jun
International Applicants	

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Special Education, Certificate of Advanced Study (C.A.S.) (p. 385)

Special Education, Certificate of Advanced Study (C.A.S.)

60 credits required

The candidate for the AGS certificate must have a master's degree or its equivalent earned at the University of Maryland or another accredited institution.

Course	Title	Credits
Required course:		
EDSP600	Issues and Trends in Educating Individuals with Disabilities	3
Select two of the following:		6
EDMS645	Quantitative Research Methods I	
EDSP670	Single Subject Research Designs	
EDSP671	Qualitative Methodologies in Special Education	
EDSP673	Evaluating Evidence-Based Practices in Special Education	3
or EDSP625	Seminar on Severely Handicapping Conditions	
Electives approved with advisor		18
Credits applicable from Master's program approved by advisor		30
Total Credits		60

Special Education for General Education Teachers in Inclusive Classrooms (Z123)

Graduate Certificate Program
College: Education

ABSTRACT

This online Professional Studies Certificate: Special Education for the General Educator is designed to equip general educators with knowledge and skills to meet the needs of students with disabilities in inclusive classroom settings. General education teachers and staff will gain evidence-based instructional strategies, effective behavioral interventions, as well as knowledge regarding the requirements of the Individuals with Disabilities Education Act (IDEA) in order to meet the needs of students with disabilities in inclusive classrooms.

contact

Website: http://www.education.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdstatementofpurposez123.pdf)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- CV/Resume
- Description of Research/Work Experience

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Certificate not accepting applications	Best Consideration: 1 Dec / Final: 14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Certificate not accepting applications	Certificate not accepting applications

Requirements

- Special Education for General Education Teachers in Inclusive Classrooms, Post-Baccalaureate Certificate (P.B.C.) (p. 385)

Special Education for General Education Teachers in Inclusive Classrooms, Post-Baccalaureate Certificate (P.B.C.)

15 credits required

Course	Title	Credits
Required courses:		
EDSP600	Issues and Trends in Educating Individuals with Disabilities	3
EDSP606	Advanced Study in Inclusive Practices in The Schools	3
EDSP613	Behavior and Classroom Management in Special Education	3
EDSP615	Evaluation and Measurement of Exceptional Children and Youth	3
EDSP652	Curriculum and Instruction: Elementary Special Education	3
Total Credits		15

Speech Language Pathology (SPLA)

Graduate Degree Program

College: Behavioral and Social Sciences

Abstract

The M.A program in Speech-Language Pathology is offered by the Department of Hearing and Speech Sciences. This program is available to post-baccalaureate students who have completed undergraduate pre-requisites in hearing and speech sciences/communication sciences and disorders. The SPLA program is an academically based, clinically oriented program designed primarily to prepare professional Speech-Language Pathologists. While information pertaining to communication disorders comprises the central focus of the degree, education about the normal processes of communication, as well as about research methods, is considered an integral part of the program.

Students completing the program are eligible to obtain the Certificate of Clinical Competence in Audiology (CCC-A) of the American-Speech-Language-Hearing Association, and licensure in the State of Maryland and other states. The program typically takes 2 years of study (5 semesters, including the intervening summer and winter semesters). Students have the option of pursuing a Cultural and Linguistic Diversity Emphasis track as part of their M.A. degree. Additionally, students can concurrently pursue a post-baccalaureate Bilingual Certificate Program in Speech-Language Pathology.

The department also offers two additional graduate degree programs. At the doctoral level, the Ph.D. in Hearing and Speech Sciences (p. 235) is offered, with concentrations in Hearing, Speech or Language (see HESP (p. 235) program code). Students applying to the Ph.D. program can opt to receive an MA in Speech-Language Pathology en route to the final degree. For this M.A-Ph.D. dual degree route, applicants should use the program code HESP when applying. Students who wish to pursue the MA degree and Ph.D. successively should apply to the MA program using the degree code SPLA. Second, a clinical doctorate in Audiology (p. 124) is offered, leading either to an Au.D. degree or a combined Au.D./Ph.D (see CAUD (p. 124)).

Financial Assistance

A limited number of graduate assistantships and fellowships are available through the Department. Assistantships that carry teaching, research or clinical responsibilities are awarded on a competitive basis. Students may also seek assistantships elsewhere on campus (such as through the Dean's office or through other departments) or fellowships sponsored by private foundations (e.g., American Speech-Language-Hearing Foundation). During most years, a limited number of scholarships are offered by Montgomery County Public Schools, which involve a post-graduation commitment to work for the school system.

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Website: http://www.hesp.umd.edu

Keywords: speech language pathology, speech therapy, rehabilitation, clinic

Relationships: Clinical Audiology (CAUD) (p. 124) **Hearing and Speech Sciences (HESP)** (p. 235) **Second Language Acquisition SLPH)** (p. 373) **Second Language Acquisition (SLMA)** (p. 371) **Special Education (EDSP)** (p. 382)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umdsupplementaryapplicationcaudsplahespcert.pdf)
- Completion of at least 60% of undergraduate pre-requisite courses prior to application. For a list of pre-requisite courses, please visit here (https://hesp.umd.edu/content/application-faqs).

Admission to the M.A. program is on a very competitive basis. Each year, the Department receives approximately 250-300 applications for 25 anticipated spaces in the M.A. program in Speech-Language Pathology. Successful M.A. applicants typically have earned at least a 3.5 undergraduate GPA (with 3.7-3.8 being the average), and have strong GRE scores and letters of recommendation and a Resume. In addition to the Graduate School requirements, the Department requires applicants to furnish scores on the Graduate Record Examination. Admission to the M.A. and CAUD programs is solely confined to fall matriculation. All students must finish their undergraduate program-specific prerequisite classes before matriculating in the fall. Prospective applicants should note that decisions on admissions are made in early March. Only full-time students are admitted.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Jan

Other Deadlines: Please visit the program website at http://www.hesp.umd.edu

Requirements

- Speech Language Pathology, Master of Arts (M.A.) (p. 387)

Facilities and Special Resources

The Department's facilities include

1) Numerous modern research laboratories equipped to support research in the areas of: acoustic phonetics, psychoacoustics, cochlear implants, infant and adult speech perception, neuropsychology, language disorders, bilingualism, and language development, voice, fluency and electrophysiology.

2) The Hearing and Speech Clinic at UMCP. this clinic serves as the initial practicum site for all students pursuing clinical training. The Clinic includes multiple audiological test suites equipped for diagnostic testing, a complete hearing aid dispensary, a group rehabilitation room, and state-of-the-art equipment for behavioral and electrophysiological diagnostic testing, as well as hearing aid selection and fitting. Ten speech and language diagnostic and therapy rooms are integrated with observation areas; and an on-site language pre-school (LEAP, the Language-Learning Early Advantage Program), also equipped for observation.

All of the clinical and research facilities are potentially available for the conduct of student-directed research projects, or for student participation in faculty-initiated research projects. Additional research and clinical facilities are available in the Washington and Baltimore metropolitan areas. The Library of Congress, the National Library of Medicine and the libraries of various medical schools in the Washington-Baltimore area supplement the University's extensive libraries at College Park.

The Department of Hearing and Speech Sciences participates in the Neuroscience and Cognitive Sciences graduate program (see NACS; https://nacs.umd.edu/), the Comparative and Evolutionary Biology of Hearing Training Grant, and the Maryland Language Science Center (http://languagescience.umd.edu), and has ties to the Center for Advanced Study of Language (CASL); these connections afford students the opportunity to work with faculty in other departments at the University of Maryland, College Park, or at UMB.

Speech Language Pathology, Master of Arts (M.A.)

Thesis or Non-thesis option: 35 credits in addition to Practical Experience

The Department of Hearing and Speech Sciences offers the Master of Arts degree with major emphasis in Speech-Language Pathology with either the thesis or the non-thesis option. The Master's degree is required by national credentialing standards for individuals intending to practice as speech pathologists in schools, hospitals, rehabilitation facilities, hearing and speech centers or in other clinical settings. Academic course work, which includes a minimum of 35 credits, is supplemented by additional credit registrations in supervised clinical practica in the University Speech and Hearing Clinic and in selected outside clinical facilities so that the graduate will meet the academic and practicum requirements for the Certificate of Clinical Competence (C.C.C.) issued by the American Speech-Language-Hearing Association, and be eligible for licensure in the State of Maryland and other jurisdictions. The Master's degree program is accredited by the Council on Academic Accreditation, the national accrediting agency which oversees graduate programs in Speech-Language Pathology and Audiology. A full description of the Master's degree program is available at our web site, listed below.

Students have the option of pursuing a Cultural and Linguistic Diversity Emphasis track as part of their M.A. degree.

Additionally, students can concurrently pursue a post-baccalaureate Bilingual Certificate Program in Speech-Language Pathology.

Course	Title	Credits
Required courses:		
HESP610	Language Disorders in Adults	2
HESP601	Foundations of Scientific Inquiry	1
HESP611	Cognitive Disorders in Adults	2
HESP612	Fluency Disorders	2
HESP620	Speech Production Disorders Across the Lifespan	3
HESP616	Language Disorders in the Pre-school Age	2
HESP624	Voice Disorders	2
HESP625	Dysphagia	2
HESP626	Language disorders in school-aged children and adolescents	2
HESP702	Diagnostic Procedures in Speech-Language Pathology	2
HESP627	Augmentative and Alternative Communication	2
HESP613	Autism Spectrum Disorders	2
HESP602	Advanced Seminar in Neurological Bases of Communication	2
Thesis or Non-Thesis Requirements		
Select one of the following options:		9
Thesis:		
Select 3 credits of electives		
HESP799	Master's Thesis Research	
Non-Thesis:		
Select 7 credits of electives		
HESP638	Research Practicum	
Total Credits		35

Student Affairs (HISA)

Graduate Degree Program
College: Education

Abstract

The Student Affairs Concentration is committed to the professional preparation of student affairs educators in higher education environments. The concentration is modeled and directed by the core values of student development, multiculturalism/social justice, leadership, scholarship and research, and ethical practices. We maintain a strong relationship with the Division of Student Affairs at the University of Maryland, College Park, which has a historic commitment to supporting scholar-practitioners. Master's graduates commonly work in settings such as student activities centers, academic advising offices, career services offices, offices of resident life, orientation, leadership programs, and multicultural centers. Doctoral graduates often become graduate faculty and/or senior administrators, directing such offices as academic advising centers, student activities, offices of student life, multicultural centers, assessment and research, learning support services, and career centers. Our location near Washington DC provides students with an abundance of opportunities to work in various higher education institutions, policy organizations, and associations in the area.

Student Affairs is a an area of concentration within The Higher Education, Student Affairs, and International Education (HESI) graduate program.

In addition to Student Affairs, HESI programs offers concentrations in Higher Education and International Education Policy. Please only include one area of concentration on your application. Before applying students should familiarize themselves with each concentration area and choose the one that most closely fits their own particular needs and aspirations. The College of Education website (http://www.education.umd.edu/) offers descriptions of all the concentrations, faculty profiles and contact information, and is an essential resource for all applicants.

HESI graduate programs are part of a new department, the Department of Counseling, Higher Education, and Special Education. Previously, Student Affairs was part of the Department of Counseling and Personnel Services and Higher Education and International Education Policy were part of the Department of Education Leadership, Higher Education and International Education. HESI is committed to advancing the positive role education can have in society. Our faculty and students study core facets of the education system; this includes the functioning and impact of colleges and universities, student learning and development in higher education, and the enactment and implementation of K-18 and nonformal education policies in an international context. HESI offerings are characterized by a particular emphasis on social justice, diversity, policy, and system change. Our students and faculty are scholars, practitioners, change agents, and innovative leaders active in universities, as well as in national and international organizations and policy-making bodies. The program is a collaborative community that develops theory, conducts research and translates these to practice, and engages students, educators, and professionals in the advancement of education.

Graduate Degrees Offered: M.A., M.Ed., Ph.D

The Master's program is designed to meet the Council for the Advancement of Standards in Higher Education criteria for Master's programs with emphasis on the college student population and multicultural issues. The Council for the Advancement of Standards (CAS) is a cooperative effort of over 40 professional associations in Student Affairs Administration who have designed standards of preparation and practice for the profession.

Financial Assistance

The Department has a very limited number of merit-based fellowships and graduate assistantships available to students. Fellowships are awarded to doctoral students in March only for the following fall semester. A large number of assistantships are also available throughout campus, and many students regularly find assistantships in other departments and offices on campus. Assistantships are most often awarded in the spring for the following fall semester, but occasionally an assistantship may become available at another time of year.

Both fellowships and assistantships are awarded on a competitive basis. It is to the student's advantage to apply well before the published application deadlines and to submit a complete application package if they intend to be considered for a fellowship, assistantship, or other form of financial aid. It is a requirement that a student be admitted as a condition of eligibility.

International students' applications are not considered complete and are not reviewed by the Department until they have received clearance from the Office of International Student and Scholar Services (ISSS), which can take additional time. If you need information about ISSS clearance visit the ISSS website at http://www.umd.edu/ies. For more information on financial assistance, see the department web site: http://www.education.umd.edu/chse/admissions/finance.

Contact

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Carol Scott
Coordinator of Graduate Studies
Department of Counseling, Higher Education, & Special Education
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Telephone: 301.405.8384
Fax: 301.405.9995
Email: chse-admissions@umd.edu

Website: http://www.education.umd.edu/CHSE/HESI_overview.html

Courses: EDCP EDHI HESI

Keywords: HESI

Relationships: Higher Education (HIED) International Education Policy (HIEP)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

To apply, please complete the application on the Graduate School Website, [click here (https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=umdgrad)**]**

For admissions information, please check out our admissions brochure and FAQ section:

SAC admissions brochure (click here) (http://education.umd.edu/CHSE/academics/specialization/SAC/inbaskets/16-17/SAC_Admissions_Brochure2017.pdf)**.**

Frequently Asked Admissions Related Questions

*For any additional questions, please feel free to contact the **Student Affairs Concentration Graduate Assistant*** (mailto)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Dec

Other Deadlines: Please visit the program website at http://www.education.umd.edu/CHSE/HESI_overview.html

Requirements

- Student Affairs, Doctor of Philosophy (Ph.D.) (p. 389)
- Student Affairs, Master of Arts (M.A.) (p. 389)
- Student Affairs, Master of Education (M.Ed.) (p. 389)

Facilities and Special Resources

Faculty and students in the Department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including international agencies and non-governmental organizations, provide exceptional opportunities for internships, field experiences, and research to enhance formal course experiences.

Student Affairs, Master of Arts (M.A.)

Thesis only: 40 credits required

Course	Title	Credits
Required courses:		
EDCP610	Professional Orientation	3
EDCP618	Counseling Skills: Introduction to Practicum	3
EDCP655		3
EDCP672		3
EDCP741	Multicultural Practice in Student Affairs: Self, Education, and Society	3
EDCP771	The College Student	3
EDCP888	Apprenticeship in Counseling and Personnel Services	1
EDCP888	Apprenticeship in Counseling and Personnel Services (EDCP888A - Apprenticeship in Student Personnel Services)	3
EDMS645 or EDCP773	Quantitative Research Methods I	3
EDCP619 or EDCP671	Practicum in Counseling (EDCP619B - Practicum in Counseling)	3
EDMS646 or EDCP773	General Linear Models I	3
Elective		3
EDCP799	Master's Thesis Research	6
Total Credits		40

Student Affairs, Master of Education (M.Ed.)

Non-thesis only: 40 credits required

Students must also write a seminar paper and pass a comprehensive exam.

The minimum number of credit hours required beyond the bachelor's degree for the M.Ed., is 40. All MEd students must do a seminar paper and a comprehensive examination.

Course	Title	Credits
Required courses:		
EDCP610	Professional Orientation	3
EDCP618	Counseling Skills: Introduction to Practicum	3
EDCP655		3
EDCP672		3
EDCP741	Multicultural Practice in Student Affairs: Self, Education, and Society	3
EDCP771	The College Student	3
EDCP888	Apprenticeship in Counseling and Personnel Services	1
EDCP888	Apprenticeship in Counseling and Personnel Services (EDCP888A - Apprenticeship in Student Personnel Services)	3
EDMS645 or EDCP773	Quantitative Research Methods I	3
EDCP619 or EDCP671	Practicum in Counseling (EDCP619B - Practicum in Counseling)	3
EDCP798	Special Problems in Counseling and Personnel Services	3
Two Professional Concentration/Focus courses		6
Elective		3
Total Credits		40

Student Affairs, Doctor of Philosophy (Ph.D.)

Phd students in Student Affairs are required to take 66 credits beyond the Master's degree. In addition to major and elective courses, each concentration requires 15 to 18 credits in research methods and 12 credits of dissertation research.

After students have completed most of their course work, a take-home comprehensive examination is required.

Doctoral students are required to complete 66 credits beyond the Master's degree including 12 credits of EDCP899, nine credits of electives, and nine credits in a professional concentration. Students can complete a three-credit internship as part of the elective requirement.

Required courses include:

Course	Title	Credits
Required courses:		
EDHI750	International Higher Education	3
EDCP774	Advanced Seminar in Theories of College Student Development	3
EDCP775	Facilitating Student Learning in Higher Education	3
EDCP776	Social Justice in Student Affairs and Higher Education	3
EDCP870	Professional Issues Seminar	3
EDCP871	Student Affairs Doctoral Capstone Seminar	3
EDHI672	Modes of Inquiry in Education Research	3
EDCP742	Examining College Environments and Outcomes	3
EDCP772	Research in Student Affairs	3
EDCP773		3
Quantitative Methods course		3
Advanced Research Methods/Methodology course		3
Electives		9
Specialization Requirements		
Select nine credits in a professional concentration		9
Dissertation Research Requirements		
EDCP899	Doctoral Dissertation Research	12
Total Credits		66

Supply Chain Management (BMSC)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial aid is available to qualified full-time and Executive MBA students in the form of fellowships, graduate assistantships, and scholarships.

Contact

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ms_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu

Courses: BMGT BUAC BUDT BUFN BULM BUMK BUMO BUSI

Admissions

We strongly encourage you to visit the Robert H. Smith School of Business website at www.rhsmith.umd.edu. The Smith School website contains a wealth of information regarding all graduate business programs and their admissions processes.

Admissions requirements can be found here: https://www.rhsmith.umd.edu/programs/ms-supply-chain-management/admissions

MBA and MS Admissions Office: 301-405-2559
Executive MBA Admissions Office: 301-405-2386
Online MBA Admissions Information: 877-807-8741
PhD Admissions Office: 301-405-2214

Admission criteria for the MS program focusing in supply chain management are based on: quality of undergraduate and graduate coursework; GMAT or GRE score, 1 letter of recommendation; professional experience; video submission; and written essay of objectives. Prospective applicants may contact the program at (301) 405-2559 for information regarding the MS program.

Apply here: https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=rhsmith

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Supply Chain Management, Master of Science (M.S.) (p. 391)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Supply Chain Management, Master of Science (M.S.)

Non-thesis only: 30 credits

The MS in Supply Chain Management program will prepare you to discover emerging opportunities and lead innovation on a global scale. Whether you're a recent graduate with an interest in how goods move around the world or a manager who would like to broaden your understanding of the global supply chain, our curriculum will prepare you for new and growing career options in this dynamic industry.

Course	Title	Credits
Required courses:		
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758 - Supply Chain Risk Management)	2
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758X - Data Models and Decisions I)	2
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758Y - Data Models and Decisions II)	2
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758L- Lean Six Sigma for Supply Chain Managers I)	2
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758V - Lean Six Sigma for Supply Chain Managers II)	2
BULM742	Global Supply Chain Resources Planning	2
BUSI758	Special Topics in Business (BUSI758J - Technology in Supply Chain Management)	2
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758J - Project Management for Supply Chain Managers)	2
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758T - Transportation Management)	2
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758B - Supply Chain Strategy)	2
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758K - Business Fundamentals for Supply Chain Managers I)	2
BUSI672	Global Supply Chain Management	2
BULM758	Special Topics in Logistics, Business and Public Policy (BULM758Q - Business Fundamentals for Supply Chain Managers II)	2
Select two of the following electives:		4
BULM733	Global Trade Logistics	
BULM724	Negotiations in Supply Chain Management	
BUMO725	Networks and Influence	
Total Credits		30

Survey and Data Science (online) (MPDS)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Joint Program in Survey Methodology (JPSM) blends together faculty with diverse disciplinary backgrounds all devoted to teaching state-of-the-art practices in the statistical and methodological aspects of surveys and data. The program's faculty primarily come from the University of Maryland, University of Michigan and Westat, supplemented by instructors from a number of federal statistical agencies. Many of these faculty are leading researchers and statisticians in the field of survey methodology, thereby providing an unparalleled educational experience to the students. JPSM's offerings include onsite PhD and Master's degrees as well as online Certificates and a Professional Master's degree.

Contact

Jody Williams
Joint Program in Survey Methodology
1218S LeFrank Hall
7251 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.314.7911
Email: jodywill@umd.edu

Website: http://jointprogram.umd.edu/

Courses: SURV

Relationships: Intermediate Survey Methodology (Z011) (p. 260) **Survey Methodology (SURV)** (p. 392) **Survey Statistics (Z010)** (p. 395)

Admissions
General Requirements

- Statement of Purpose: Complete a one-page essay describing relevant work experience, interest in survey and/or data science, and expected benefits of enrolling in this degree program. (Uploaded to the Statement of Purpose in the application.)
- Transcript(s): Should show previous coursework or knowledge in mathematical/applied statistics demonstrated by completion of 6 credits of applied statistical methods courses covering content from probability theory through basic regression techniques (including both OLS and logistic regression)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmpds.pdf)
- Supplementary Application Two: Prerequisites

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Applicants must have earned a four-year baccalaureate degree from a regionally accredited U.S. institution, or an equivalent degree from a non-U.S. institution. Applicants must have earned a 3.0 GPA (on a 4.0 scale) in all prior undergraduate and graduate coursework.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	29 Jun	31 Oct
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	29 Jun	31 Oct

Other Deadlines: Please visit the program website at http://jointprogram.umd.edu/

Requirements

- Survey and Data Science, Master of Professional Studies (M.P.S.) (p. 392)

Facilities and Special Resources

Training will be provided by permanent and adjunct faculty in the University of Maryland's Joint Program in Survey Methodology. Online lectures will be conducted via accessible video conference systems and Webinar tools.

Students will be instructed that to fully participate, they will need to purchase a webcam and headset with a microphone, and have a reliable computer and Internet access. Recorded lectures will be posted online at announced times and will be available online at any time thereafter during the course. Weekly discussions or help sessions will be held at scheduled, fixed times once per week.

As officially admitted students to the University of Maryland, students in this program will have access to all University resources that are accessible in the online environment. Students in online programs are assessed an online student services mandatory fee which supports access to these University resources.

Survey and Data Science, Master of Professional Studies (M.P.S.)

The online *International Master of Professional Studies in Survey and Data Science* will provide post-baccalaureate training for individuals interested in broadening their knowledge and understanding of the emerging field of data science, the conduct of sample surveys, practical applications of data analysis and survey methodology, and data management, along with the skills needed to communicate results.

Survey methodology, which is already an interdisciplinary field drawing upon statistics, sociology, economics, political science, informatics, public health (e.g., physical measures taken on respondents), and the geographic sciences (e.g., geographic information systems), is now intersecting with the big data world. As public and private organizations are increasingly combining various data sources, including survey data, for the purpose of decision making, the need for professional development in data generation, quality and analysis is on the rise. The online environment is convenient for working professionals who cannot easily travel to a traditional campus. In addition, courses will be shared with our international partners, providing a rich perspective to class discussions.

Course	Title	Credits
Required courses:		
SURV400	Fundamentals of Survey and Data Science	3
Data Generating Processes (choose 4 credits)		4
SURV623	Data Collection Methods in Survey Research	
SURV630	Questionnaire Design and Evaluation	
SURV699	Special Topics in Survey Methodology (SURV699L - Record Linkage)	
SURV745	Practical Tools for Sampling and Weighting	
or SURV625	Applied Sampling	
SURV722	Research Design: Causal inference from randomized and observational data	
Data Curation and Storage (choose one course)		3
INST733	Database Design	
INST767	Big Data Infrastructure	
INST640	Principles of Digital Curation	
Data Analysis (choose 6 credits)		6
SURV701	Analysis of Complex Sample Data	
SURV751	Introduction to Big Data and Machine Learning	
SURV730	Measurement Error Models	
SURV798	Advanced Topics in Survey Methodology (SURV798Z - Bayesian Analysis)	
Data Output/Access (choose 3 credits)		3
INST610	Information Ethics	
SURV735	Data Confidentiality and Statistical Disclosure Control	
INST760	Data Visualization	
Electives		11
Total Credits		30

Survey Methodology (SURV)

Graduate Degree Program

College: Behavioral and Social Sciences

Abstract

The Survey Methodology Program blends together faculty with diverse disciplinary backgrounds, all devoted to teaching state-of-the-art practices in the statistical and methodological aspects of surveys. The program's faculty come primarily from the University of Maryland, University of Michigan, and Westat, supplemented by instructors from a number of federal statistical agencies.

SURV offers a Master of Science in Survey Methodology and a Ph. D. in Survey Methodology. Both degree programs have three areas of concentration: Statistical Science , Social and Psychological Science and Data Science.

The **statistical science** area of concentration is designed for students who wish to specialize in areas such as sample design, estimation in complex samples, variance estimation, statistical measurement error models, and statistical adjustments for missing data.

The **social science** area of concentration is designed for students who wish to specialize in areas such as questionnaire design, design of interviewing systems, computer assistance in data collection, effects of mode of data collection, cognitive psychological insights into survey measurement, and efforts to reduce various nonsampling errors in data collection.

The **data science** area of concentration is designed for students who wish to specialize in the more computational aspects of survey methodology and research involving "big data," including data visualization, management and analysis of large and messy data sets, human-computer interaction in survey research, and machine learning algorithms.

The three areas of specialization share a set of courses in the core curriculum (https://jpsm.umd.edu/graduate/masters-sample-curricula), including a two term survey practicum, a course in data collection methods, two terms of statistical methods, a two term course in total survey quality, and a survey design seminar.

Financial Assistance

Financial assistance is available in the form of competitive fellowships and graduate assistantships for teaching or research.

Fellowships in Support of Diversity and Inclusion (https://jpsm.umd.edu/graduate/phd-admissions): Financial support option for Ph.D. students only. If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences (2017-18), please be sure to upload your materials under "4. Supplementary Application Two" when submitting your online admissions application.

Contact

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Director of Administrative Services
Joint Program in Survey Methodology
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College Park, MD 20742
Telephone: 301.314.7911
Fax: 301.314.7912
Email: survgrad@deans.umd.edu

Website: http://www.jpsm.umd.edu

Courses: SURV SURV

Keywords
Social Science Concentration: Questionnaire Design, Social and Cognitive Foundations of Survey Measurement, Analysis of Complex Data, Survey Management. Statistical Science Concentration: Statistical Methods, Topics in Sampling, Inference from Complex Surveys, Probability Theory, Mathematical Statistics, Data Science Concentration: Big Data, Data Visualization, Human- computer interaction in survey research, machine learning algorithms, analysis of large and messy data sets.

Relationships: Intermediate Survey Methodology (Z011) (p. 260) **Survey and Data Science (online) (MPDS)** (p. 391) **Survey Statistics (Z010)** (p. 395)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationsurv.pdf)

Applicants to the M.S. program are expected to hold a baccalaureate degree from a regionally accredited institution with a minimum of a 'B' average. Post-baccalaureate coursework and relevant work experience will also be used in the application evaluation. Entry to the statistical science concentration requires three undergraduate courses in calculus, one in linear algebra, and one in statistics. Entry to the social science concentration requires two undergraduate quantitative courses, at least one of which is in statistics, and at least two undergraduate courses in the social sciences. Entry to the data science concentration requires some background in computer science, with a minimum of two semesters of programming coursework, and also at least one semester of statistics.

Applicants to the Ph.D. program are expected to have a graduate degree in some field (such as statistics or psychology) that is related to survey methodology. Applicants must also demonstrate an appropriate quantitative background.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	5 Jan
International Applicants	

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	5 Jan

Other Deadlines: Please visit the program website at http://www.jpsm.umd.edu

Requirements

- Survey Methodology, Doctor of Philosophy (Ph.D.) (p. 394)
- Survey Methodology, Master of Science (M.S.) (p. 394)

Facilities and Special Resources

SURV has the goal of offering training to all qualified students, regardless of the employment sector of interest to them. Several features of the program are designed with the working student in mind. Many class times are tailored to be compatible with the work day; a 12-month curriculum offers core courses throughout the year; and research experience requirements are integrated with work activities.

Courses have been offered at a Federal agency facility located in Washington, D.C. and interactive 2-way audio/video transmission equipment is used to transmit some courses between the College Park campus and the Ann Arbor campus of the University of Michigan,also - between College Park and the Census headquarters in Suitland, MD.

Survey Methodology, Master of Science (M.S.)

Non-thesis option only: 46 credits required

SURV offers a non-thesis program, however students in all three tracks the statistical science, social and psychological science and data science concentrations must fulfill a research experience requirement, yielding a scholarly paper. This paper must be the result of either original research conducted by the student, critical analysis, or evaluation of existing surveys.

Students choose from one of the following concentrations:

Statistical Science

Course	Title	Credits
Required courses:		
SURV615	Statistical Modeling I	3
SURV616	Statistical Modeling II	3
SURV720	Total Survey Error and Data Quality I	2
SURV721	Total Survey Error and Data Quality II	2
SURV772	Survey Design Seminar	3
SURV617	Applications of Statistical Modeling	3
Fundamentals of Data Collection I		3
Fundamentals of Data Collection II		3
Fundamentals of Computing and Data Display		3
Specialization requirements:		
SURV410	Introduction to Probability Theory	3
SURV420	Introduction to Statistics	3
SURV440	Sampling Theory	3
SURV742	Inference from Complex Surveys	3
Electives		9
Total Credits		46

Social and Psychological Science

Course	Title	Credits
Required courses:		
SURV615	Statistical Modeling I	3
SURV616	Statistical Modeling II	3
SURV720	Total Survey Error and Data Quality I	2
SURV721	Total Survey Error and Data Quality II	2
SURV772	Survey Design Seminar	3
SURV617	Applications of Statistical Modeling	3
Fundamentals of Data Collection I		3
Fundamentals of Data Collection II		3
Fundamentals of Computing and Data Display		3
Specialization requirements:		
SURV625	Applied Sampling	3
SURV630	Questionnaire Design and Evaluation	3
SURV632	Cognition, Communication and Survey Measurement	3
SURV701	Analysis of Complex Sample Data	3
Fundamentals of Inference		3
Electives		6
Total Credits		46

Data Science

Course	Title	Credits
Required courses:		
SURV615	Statistical Modeling I	3
SURV616	Statistical Modeling II	3
SURV720	Total Survey Error and Data Quality I	2
SURV721	Total Survey Error and Data Quality II	2
SURV772	Survey Design Seminar	3
SURV617	Applications of Statistical Modeling	3
Fundamentals of Data Collection I		3
Fundamentals of Data Collection II		3
Fundamentals of Computing and Data Display		3
Specialization requirements:		
SURV625	Applied Sampling	3
SURV701	Analysis of Complex Sample Data	3
Fundamentals of Inference		3
Electives		12
Total Credits		46

Survey Methodology, Doctor of Philosophy (Ph.D.)

Students must participate in the Ph.D. seminar for four semesters by enrolling in SURV829 for a total of 12 credits. Students must also complete 12 credits of SURV899.

There are five major requirements for the Ph.D. Students must pass a qualifying examination (normally at the end of their first year) and a

comprehensive examination (normally at the end of their second year). They must participate in the Ph.D. seminar for four semesters. They must meet a residency requirement which consists of spending at least two days per week at JPSM for a period of three semesters. Finally, they must complete a dissertation.

Course	Title	Credits
SURV829	Doctoral Research Seminar in Survey Methodology (participate for four semesters)	12
Dissertation Research Requirements		
SURV899	Doctoral Dissertation Research	12
Total Credits		24

Survey Statistics (Z010)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The Post Baccalaureate (Graduate) Certificate in Survey Statistics offers training in sampling design and estimation for individuals who have graduate-level coursework in statistics but desire specific knowledge and training in survey statistics. Both domestic U.S. and international students are welcome to apply. The program is taught at the graduate level but covers fewer topic areas than the onsite M.S. program in survey methodology offered by JPSM.

CONTACT

Rupa Jethwa Eapen
Director of Administrative Services
Joint Program in Survey Methodology
1218 LeFrank Hall
7251 Preinkert Drive
College Park, MD 20742
Telephone: 301.314.7911
Fax: 301.314.7912
Email: survgrad@deans.umd.edu

Website: http://www.jpsm.umd.edu

Courses: SURV

Relationships: Intermediate Survey Methodology (Z011) (p. 260)
Survey Methodology (SURV) (p. 392)

Admissions

Applicants must meet the following minimum admission criteria as established by the Graduate School:

- Applicants must have earned a four-year baccalaureate degree from a regionally accredited U.S. institution, or an equivalent degree from a non-U.S. institution.
- Applicants must have earned a 3.0 GPA (on a 4.0 scale) in all prior undergraduate and graduate coursework.
- Applicants must provide an official copy of a transcript for all of their post-secondary work.
- International students must fulfill all requirements relating to international academic credentials, evidence of English proficiency, and financial certification. Since the students will not have to enter the U.S., visas will not be required. These requirements are found at the Graduate School's Web site
- For the Survey Methodolgy certificate, students must have completed a basic statistics course at a graduate or undergraduate level covering concepts such as probability theory, t-tests, ANOVA and multiple regression. If a student cannot show completion of such a course, the student will be asked to follow a free online self-paced course on these topics and complete an online examination, scoring a B or better.
- For the Survey Statistics certificate, students must demonstrate graduate level knowledge of statistics and probability theory. If the student does not already have a statistics or biostatistics graduate degree, the applicant must demonstrate completion of prior course work comparable to the following courses offered at UMD: STAT 410 (graduate-level probability theory course), STAT 420 (graduate-level mathematical statistics course), SURV 615 and SURV 616 (a two-term sequence in statistical methods).*(Please view syllabi here for comparison* (http://jpsmdev.umd.edu/jointprogram)*)*

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the program website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program webite

Other Deadlines: Please visit the program website at http://www.jpsm.umd.edu

Requirements

- Survey Statistics, Post-Baccalaureate Certificate (P.B.C.) (p. 395)

Survey Statistics, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Required courses:		
SURV440	Sampling Theory	3
SURV625	Applied Sampling	3
or SURV745	Practical Tools for Sampling and Weighting	
SURV742	Inference from Complex Surveys	3
SURVxxx	electives [1]	6
Select one of the following:		3
SURV699	Special Topics in Survey Methodology (SURV699X -Statistical Analysis with Missing Data)	
SURV744	Topics in Survey Methodology	
SURV798	Advanced Topics in Survey Methodology (SURV798B - Small Area Estimation)	

SURV798	Advanced Topics in Survey Methodology (SURV798Z - Bayesian Modeling and Inference)
Total Credits	18

[1] Must be SURV620 or higher.

Sustainable Development and Conservation Biology (CONS)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

This program is not currently accepting applications. Please visit our graduate program listing (p. 18) for information on other programs.

Abstract

The principal objective of the CONS Program is to provide graduate training in Sustainable Development and Conservation Biology. CONS is an interdisciplinary and experiential approach to the problems of biological conservation in relation to economic development necessary to meet human needs.

The primary goals of the CONS program are:

1. to provide students with the knowledge and problem-solving skills necessary to research and communicate solutions to global environmental issues;
2. to expand the reach of biodiversity conservation and increasing sustainability;
3. to produce leaders and decision-makers in conservation science that are employed by academia, in government, or non-governmental agencies (NGOs); and
4. to provide a service role to the state of Maryland, the nation, local communities, and national and international NGOs and government agencies.

Specifically the program's objectives are to: provide broad, multidisciplinary training in the core areas of biological conservation, resource economics, and policy analysis; and explicitly link the conflicting topics of sound conservation of natural resources with sustainable development to meet human needs.

CONS graduates are well-prepared to address conservation issues for employers in the private sector and in local, state and national government posts; and to enter Ph.D. programs for further, specialized training.

CONS offers a dual-degree program (PPCN) with the School of Public Policy, wherein students receive both Master of Science and Master of Public Policy degrees. For more information on our degree programs and academic requirements, please see our website at http://cons.umd.edu/cons

Financial Assistance

Students applying to the Program may be nominated for graduate fellowships or may be supported by teaching or graduate assistantships. Fellowship and assistantship offers are made on the basis of past academic performance, financial need, and potential to contribute to the program.

Contact

Karen Lips, Ph.D.
Director of Graduate Studies
Department of Biology
1201 Biology-Psychology Building
4094 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7409
Fax: 301.314.9358
Email: consoffice@umd.edu

Website: http://cons.umd.edu/cons

Keywords: Inter-disciplinary Training in Ecology, Resource Economics, Public Policy issues and Problem Solving related to Conservation of Biodiversity and the Continued Functioning of Natural Systems.

Relationships: Biological Sciences (BISI) (p. 81) **Marine, Estuarine, and Environmental Sciences (MEES)** (p. 283)

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationcons.pdf)
- Publications/Presentations

Admission to the CONS Program is competitive, and applicants tend to be a self-selecting group of high achievers. Applicants must have an undergraduate degree and comply with all Graduate School guidelines to be considered for admission, with the most competitive applicants demonstrating preparedness for graduate coursework in ecology, resource economics, and public policy.

CONS has no formal course prerequisites for admission, but admission is highly competitive. CONS students have an established record of excellence in their academic (e.g., high GRE and GPA scores, prestigious honors and awards) and professional careers (e.g., relevant, real-world employment experience at NGOs, government agencies, research labs, Peace Corps, internships). CONS students have leadership abilities, and evidence of research experience (e.g., publications, presentations, internships), are good communicators. Successful applicants typically have a strong background in biology, and are expected to have sufficient academic preparation to enroll in the required graduate level courses in Ecology, Natural Resource Economics, and Environmental Policy. It is encouraged that incoming students have taken one or more courses in statistics, other quantitative skills, mathematics, GIS analysis, economics, and/or have foreign language skills. Many prospective applicants take one or more post-baccalaureate courses in preparation.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not accepting applications for Fall 2018
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Not accepting applications for Fall 2018

Other Deadlines: Please visit the program website at http://www.cons.umd.edu

Requirements

- Sustainable Development and Conservation Biology, Master of Science (M.S.) (p. 397)

Facilities and Special Resources

The program is housed within the Department of Biology but is campus-wide in scope. We have strong connections with the School of Public Policy because ~30% of CONS students are enrolled in the dual degree PPCN program. We have strong connections with AREC because CONS students take a required course in natural resource economics. All CONS students complete an internship - either in a research lab, with an NGO, or with an agency - either in the DC area or further abroad. All CONS students select a faculty advisor relevant to the topic of their scholarly paper, which results in many interactions with environmental faculty in Anthropology, Entomology, Environmental Science & Technology, Latin American Studies, MEES, Public Policy, Plant Sciences and Landscape Architecture, and other departments.

Sustainable Development and Conservation Biology, Master of Science (M.S.)

This Master of Science Program was initiated in 1991 to provide new training and educational emphasis in the areas of sustainable development and conservation biology. The program applies an interdisciplinary and experiential approach to the challenges of biological conservation in relation to the economic development necessary to meet human needs. It includes four components:

1. core courses in the areas of ecology and conservation biology, resource economics, public policy, and multi-disciplinary problem solving;
2. elective courses from a wide array of disciplines;
3. an internship experience relevant to the student's career interests;
4. a Scholarly Paper - a rigorous, quantitative analysis of an Environmental Problem that synthesizes the student's coursework, internship experience, and career interests.

Course requirements for the program total 39 credits. This is intended to be a two-year program. Please contact the department for more information.

Systems Engineering (ENSE)

Graduate Degree Program
College: Engineering

Abstract

Students in the broadly-based, cross-disciplinary Master of Science in Systems Engineering (ENSE) program at ISR benefit both academically and professionally by:

- Being exposed to a wide range of systems engineering principles and software tools tailored toward support for visual modeling of systems, requirements engineering, system-level modeling, optimization and trade-off analysis, and human factors engineering.
- Becoming familiar with the financial and management issues associated with complex engineering systems.
- Acquiring a deep understanding of one particular application area.
- Becoming familiar for opportunities for leadership within the systems engineering profession.
- Designed with substantial industry input, the ENSE curriculum represents the University of Maryland's first multi-college graduate degree program involving the A. James Clark School of Engineering.

In addition to the technical management of systems projects, the ENSE program covers a wide range of topics, from systems definition, requirements and specifications, to systems design, implementation, and operation. Students specialize in one technical area, selected from computer and software systems, communication and networking systems, signal processing systems, control systems, manufacturing systems, operations research, transportation systems, and robotics. The ENSE program draws upon the extensive engineering, computer science and management experience of the of University of Maryland faculty. The program makes optimum use of the university's advanced facilities, including extensive libraries of numerical, symbolic, and visualization software, engineering workstations, and wireless communication networks.

Financial Assistance

Prospective and current students may seek support for their studies through graduate research assistantships with ISR faculty or graduate fellowships. Students currently working in industry, the military, or the government, who plan to pursue their graduate studies part-time, might ask their employers about tuition assistance. All applicants are encouraged to explore sources of external funding; a number of comprehensive Internet sites, such as fastweb.com, offer detailed information and application instructions.

Contact

Master of Science in Systems Engineering (ENSE) Program
Institute for Systems Research
2175 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4419
Fax: 301.314.9920
Email: jmaccart@umd.edu

Website: http://www.isr.umd.edu/education/systems-engineering-education

Courses: ENSE

Relationships: Aerospace Engineering (ENAE) (p. 26) **Chemical Engineering (ENCH)** (p. 112) **Civil and Environmental Engineering (ENCE)** (p. 118) **Computer Science (CMSC)** (p. 138) **Cybersecurity Engineering (Z073)** (p. 157) **Electrical and Computer Engineering (ENEE)** (p. 168) **Engineering and Public Policy (MEPP)** (p. 183) **Materials Science and Engineering (ENMA)** (p. 286) **Mathematics (MATH)** (p. 295) Mechanical Engineering (ENME) (p. 300) Project Management (PMPM) (p. 337) Reliability Engineering (ENRE) (p. 356) Systems Engineering (PMSE) (p. 399)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

PROGRAM-SPECIFIC REQUIREMENTS

- GRE General highly recommended for applicants seeking financial support
- 3 Letters of Recommendation
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 15 Dec / Final: 15 Mar	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority: 15 Dec / Final: 1 Feb	28 Sep

Other Deadlines: Please visit the program website at http://www.isr.umd.edu/education/systems-engineering-education

Requirements

- Systems Engineering, Master of Science (M.S.) (p. 398)

Facilities and Special Resources

Modern laboratory, computation, and networking environments play an indispensable role in both the development and day-to-day operation of the research and education programs at the Institute for Systems Research. In all of the ISR laboratories, real-life experiments and associated research studies are enabled through the integrated design of automation and information engineering systems. Computational environments support advanced numerical simulation, sensing and control, and automated design of complex heterogeneous engineering systems. Networking environments play an indispensible role in enabling of interdisciplinary teams of faculty and students to work together. Prototype designs in both hardware and software have led to technological discoveries and patentable inventions.

ISR was established in 1985 as one of the first six National Science Foundation Engineering Research Centers (ERCs). Now a self-sustaining ERC, it is a permanent state-supported institute of the University of Maryland, within the A. James Clark School of Engineering. ISR faculty and graduate students perform basic and applied research with an emphasis on six major research directions: systems engineering methodologies and tools, global communications systems, sensor-actuated networks, next generation product-realization systems, societal infrastructure systems, and cross-disciplinary systems engineering education. ISR seeks a cohesive and balanced approach to the modeling, design, and control of large heterogeneous systems, bringing together a diversified team of outstanding engineers, scientists, and students to research, develop, and implement advances in systems engineering.

Systems Engineering, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

Course	Title	Credits
Required courses:		
ENSE621	Systems Concepts, Issues, and Processes	3
ENSE622	Systems Requirements, Design and Trade-Off Analysis	3
ENSE623	Systems Projects, Validation and Verification	3
ENSE624	Human Factors in Systems Engineering	3
ENSE626	System Life Cycle Analysis and Risk Management	3
ENSE627	Systems Quality and Robustness Analysis	3
Thesis or Non-Thesis Requirements		
Select one of the following options:		12
Thesis:		
Select two additional electives from one specialization area		
ENSE799	Systems Engineering Thesis	
Non-Thesis:		
Select four additional electives from no more than two specialization areas		
Complete a scholarly paper		
Specialization Requirements		
Select from the following specialization areas:		
Communication and Networking Systems		
Computer and Software Systems		
Control Systems		
Manufacturing Systems		
Operations Research		
Process Systems		
Robotics		
Signal Processing Systems		
Cybersecurity		

Transportation Systems	
Total Credits	30

General requirements for the master's thesis and non-thesis options are those of the University of Maryland Graduate School. All requirements must be completed within 5 years. The thesis option requires each student to obtain a total of 30 credit hours: 24 hours of coursework and six (6) hours for the thesis project to complete the program. The coursework includes 18 credits for the six core courses (four courses from the systems engineering core and two courses from the management core), and two (2) elective courses. The elective courses must be taken from one specialization area. The master's thesis project demonstrates the practical implications of systems engineering principles. The thesis project may be related to a practical industrial system, and must be supervised by the academic advisor.

The non-thesis option requires each student to obtain a total of 30 credit hours of coursework to complete the program (four courses from the systems engineering core, two courses from the management core, and four elective courses). The elective courses must be taken from not more than two specialization areas. In addition, students must complete a scholarly paper. Expectations of the scholarly paper: While less detailed and complex than the thesis, the scholarly paper also contributes to systems engineering research. For example, a student might chose to write a literature review, identify and propose a solution to a systems problem encountered on the job, or prepare a systems case study. The scholarly paper is prepared under the supervision of the student's academic advisor. It also must be read by at least one additional ISR faculty member, and approved by the ENSE graduate director. No specific format is required by the Graduate School.

Systems Engineering (PMSE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Systems Engineering program prepares professional engineers to coordinate the planning, development, and creation of systems in fields like aerospace, telecommunications, neuroscience, robotics, and more. Students pursuing this option may choose to use their electives to obtain a certificate in one of the many other programs offered by the Office of Advanced Engineering Education.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/systems-engineering.

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information visit https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Systems Engineering, Master of Engineering (M.Eng.) (p. 400)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Systems Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENPM641	Systems Concepts, Issues, and Processes	3
ENPM642	Systems Requirements, Design and Trade-Off Analysis	3
ENPM643	Systems Projects, Validation and Verification	3
ENPM644	Human Factors in Systems Engineering	3
ENPM646	System Life Cycle Cost Analysis and Risk Management	3
ENPM647	Systems Quality and Robustness Analysis	3
Select 12 credits of electives approved by advisor		12
Total Credits		30

Systems Engineering (Z067)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Systems Engineering program prepares professional engineers to coordinate the planning, development, and creation of systems in fields like aerospace, telecommunications, neuroscience, robotics, and more. Students pursuing this option may choose to use their electives to obtain a certificate in one of the many other programs offered by the Office of Advanced Engineering Education.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

For additional program-specific admission requirements, please visit: https://advancedengineering.umd.edu/systems-engineering.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents,

consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required. For more information on the Office of Advanced Engineering Education admissions process: https://advancedengineering.umd.edu/application-process.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 401)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Systems Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets

Course	Title	Credits
Required courses:		
ENPM641	Systems Concepts, Issues, and Processes	3
ENPM642	Systems Requirements, Design and Trade-Off Analysis	3
ENPM643	Systems Projects, Validation and Verification	3
Select one additional approved course		3
Total Credits		12

Teaching English to Speakers of Other Languages (Z099)

Graduate Certificate Program
College: Education

Abstract

This certificate is only open to students enrolled at the University of Maryland, College Park. This is a cohort-based program. Please visit the department website for more information.

Website: http://www.education.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Resident	Please visit the department website	Please visit the department website
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Teaching English to Speakers of Other Languages, Post-Baccalaureate Certificate (P.B.C.) (p. 402)

Teaching English to Speakers of Other Languages, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
EDCI631		3
EDCI634		3
EDCI732		3
TLPL660	Foundations of Literacy and Biliteracy Development	3
Total Credits		12

TEACHING AND LEARNING, POLICY AND LEADERSHIP (EDPS)

Graduate Degree Program
College: Education

Abstract

The Department of Education Policy Studies (EDPS) merged with the Department of Curriculum and Instruction (EDCI) to form the Department of Teaching and Learning, Policy and Leadership (TLPL). For more detailed and up-to-date information about programs and resources see the TLPL website at http://education.umd.edu/TLPL.

The programs in Education Policy Studies (EDPS) in the Department of Teaching and Learning, Policy and Leadership promotes critical and discipline-based studies of education policies and practices; encourages thoughtful and responsive explorations of education and related social issues; and fosters innovative and collaborative efforts to inform education policy and leadership at all levels of government.

Graduates pursue professional roles in university teaching and research, fill policy and leadership positions in public and private educational institutions, and work as specialists and advocates in governmental and non-governmental agencies. The Department offers graduate programs of study leading to the M.A.

Faculty bring the disciplines of ecomomics, political science, history, philosophy, sociology, cultural studies, curriculum theory, and organizational leadership to the study of education. They are committed to the preparation of professionals who are able to apply a range of theories and disciplinary perspectives to the enterprise of education in governmental and non-governmental agencies.

For graduate programs related to Curriculum and Instruction, please see Education: Curriculum and Instruction (EDCI). **Note: This section includes information about the M.A. programs previously associated with the Department of Education Policy Studies (EDPS); students interested in these programs should apply to EDPS, though TLPL now sponsors these programs. Students interested in the Department's new Ph.D. program should go to Education: Teaching and Learning, Policy and Leadership (TLPL) in the graduate catalog.**

Financial Assistance

A variety of sources are available for seeking financial assistance in the way of graduate assistantships, scholarships, fellowships and financial aid loans. For more information visit http://www.education.umd.edu/TLPL/admissions/financiad.html.

Contact

Joy Jones
Coordinator for Graduate Admissions and Student Services
Department of Teaching and Learning, Policy and Leadership
2311 Benjamin Building
3942 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3118
Fax: 301.314.9055
Email: tlpl-grad@umd.edu

Website: http://www.education.umd.edu

Keywords: Education Policy; Degrees offered: M.A.,Ph.D.; Specializations in Curriculum Theory and Development; Education Policy; Socio-cultural Foundations of Education; Studies; Organizational Leadership; Organizational Leadership and Policy Studies; Teaching and Learning, Policy and Leadership.

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample

Note: Applicants for the EDPS master's program are accepted for the **fall only**.

To be recommended for full admission to a master's program, a minimum undergraduate grade point average of 3.0 is required. Scores on the Graduate Record Examination (verbal, quantitative, writing) should be at the 50th percentile or higher. Because graduate programs are highly competitive, successful applicants often score considerably higher. Students who do not meet one of these requirements, but show other evidence of outstanding potential, may be considered for provisional admission. Admission of qualified applicants is based on their competitive ranking to limit enrollments to available faculty resources. See the description of the EDPS programs on the TLPL website (http://www.education.umd.edu/TLPL) for more detailed information.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	1 Mar
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	1 Feb

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Teaching and Learning, Policy and Leadership, Master of Arts (M.A.) (p. 405)

Facilities and Special Resources

Faculty and students in the department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including embassies and other international organizations, provide exceptional opportunities for internships and field experiences, research, and materials to enhance formal course experiences. Facilities that support graduate study include the Center for Mathematics Education, the Center for Science and Technology in Education, the Multicultural Research Center, and the Maryland Equity Project. Additional facilities in the College of Education include the Educational Technology Services Center and numerous Professional Development Schools in local schools districts.

TEACHING AND LEARNING, POLICY AND LEADERSHIP, MASTER OF ARTS (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Course	Title	Credits
Coursework chosen with advisor		24
Thesis or Non-thesis option		6
Thesis:		
TLPL799	Master's Thesis Research	
Non-thesis option		
TLPL699	Master's Seminar	
Additional course		
Total Credits		30

Teaching and Learning, Policy and Leadership (TLPL)

Graduate Degree Program
College: Education

Abstract

The newly approved TLPL Ph.D. program is a reorganization of current, on-campus doctoral programs of study into six related specializations

1. Education Policy and Leadership,
2. Language, Literacy and Social Inquiry,
3. Mathematics and Science Education,
4. Minority and Urban Education,
5. Teacher Education and Professional Development, and
6. Technology, Learning and Leadership.

These specializations prepare doctoral students to assume a variety of roles, including scholars, researchers, policy analysts, teacher educators, instructional specialists, curriculum developers, teachers, education leaders and advocates. The revision and consolidation of previous areas of study provides students with new opportunities for interdisciplinary study that emphasize scholarship in critical areas of education research, including teacher preparation, STEM fields of education, literacy and language acquisition, education policy and leadership. For more details about this program please visit http://www.education.umd.edu/TLPL/academics/programs.html.

This section includes information about the Ph.D. program sponsored by the Department of Teaching and Learning, Policy and Leadership (TLPL). For information about our master's programs please see information under Education: Curriculum and Instruction (EDCI) and/or Education: Education Policy Studies (EDPS) in the graduate catalog.

Financial Assistance

The Department offers a limited number of graduate assistantships to newly admitted, full-time Ph.D. students each year. In addition to a possible graduate assistantship, TLPL is able to award a very limited number of Graduate School fellowships each year. These fellowships are awarded only to full-time graduate students and may provide tuition support and/or additional living stipends. All Ph.D. applicants who are offered full-time admissions will be considered for an assistantship and fellowship. For best consideration for fellowships, applicants should apply by the December 1st preferred deadline. For more information visit http://www.education.umd.edu/TLPL/admissions/financiad.html.

Contact

Joy Jones
Coordinator for Graduate Admissions and Student Services
Department of for Teaching and Learning, Policy, and Leadership
2311A Benjamin Building
3942 Campus Drive
College Park, MD 20742
Telephone: 301.405.3118
Fax: 301.314.9055
Email: tlpl-grad@umd.edu

Website: http://www.education.umd.edu/TLPL

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample

Applications for the Ph.D. program are accepted for the Fall only.

To be recommended for full admission to the TLPL Ph.D. program, a minimum undergraduate grade point average of 3.0 is required. A minimum graduate grade point average of 3.5 is required for applicants who have completed a graduate program. The Graduate Record Exam (GRE) is required of applicants and scores should be at the 50th percentile or higher. Because graduate programs are highly competitive, successful applicants often score considerably higher. Students who do not meet one of these requirements, but show other evidence of outstanding potential, may be considered for provisional admission. Admission of qualified applicants is based on their competitive ranking to limit enrollments to available faculty resources. See the description of the TLPL programs and admissions overview on the TLPL website for more detailed information: http://www.education.umd.edu/TLPL/.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	4 Dec
International Applicants	

F (student) or J (exchange visitor) visas A,E,G,H,I and L visas and immigrants	4 Dec

Other Deadlines: Please visit the program website at http://www.education.umd.edu/TLPL

Requirements

- Teaching and Learning, Policy and Leadership, Doctor of Philosophy (Ph.D.) (p. 406)

Facilities and Special Resources

Faculty and students in the department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including embassies and other international organizations, provide exceptional opportunities for internships and field experiences, research, and materials to enhance formal course experiences. Facilities that support graduate study include the Center for Mathematics Education, the Center for Science and Technology in Education, the Multicultural Research Center, and the Maryland Equity Project. Additional facilities in the College of Education include the Educational Technology Services Center and numerous Professional Development Schools in local schools districts.

Teaching and Learning, Policy and Leadership, Doctor of Philosophy (Ph.D.)

The Ph.D. degree requires a planned sequence of 60 credits beyond a master's degree OR 90 credits beyond a bachelor's degree. In addition to major and elective courses, this includes 6 credits of integrative departmental core, a minimum of 12 credits in intermediate and advanced research methods, 30 credits within the student's specialization and 12 credits of dissertation research. After students have completed most of their course work, the equivalent of 12 hours of comprehensive examination is required prior to advancing to candidacy and approval of the doctoral dissertation committee. The comprehensive exam may take a variety of forms, such as take-home conceptual essays, literature reviews, or research papers. The Doctoral program integrates theory, research, and practice, and students are expected to demonstrate high standards of scholarship and the ability to engage in independent research. Your faculty advisor will help you develop a program of study that will help you fulfill your degree requirements, both coursework and examinations, that is consistent with Departmental and University guidelines. An oral examination in defense of the dissertation is required. It is strongly recommended that prospective doctoral applicants speak with program coordinators and faculty, and visit the Department and classes, to help determine if the Department's programs are appropriate to their academic interests and professional goals.

Students must complete a minimum of 60 credits beyond the master's degree. Coursework is outlined as follows:

Course	Title	Credits
Core Requirements		
EDPS788	(EDPS788P)	3
EDPS788	(EDPS788T)	3
Complete 12 credits in Intermediate & Advanced Methods [1]		12
Specialization Requirements		
Complete coursework in one of the following specializations:		30
Education Policy & Leadership		
Language, Literacy & Social Inquiry		
Mathematics & Science Education		
Minority & Urban Education		
Teacher Education & Professional Development		
Technology, Learning & Leadership		
Dissertation Research Requirements		
EDPS899		12
Total Credits		60

[1] Must include one qualitative methods course and one quantitative methods course

Technology Entrepreneurship (MPTE)

Graduate Degree Program
College: Engineering

Abstract

The Master of Professional Studies in Technology Entrepreneurship unites academic insights with startup incubator skills and resources to empower students to launch and grow technology ventures. Developed by the A. James Clark School of Engineering's Maryland Technology Enterprise Institute (Mtech), University of Maryland, the MPS in Technology Entrepreneurship is a fully online program designed to equip students with a conceptual understanding of the principles and action steps of effective new venture creation and launch.

The MPS in Technology Entrepreneurship prepares students to apply newly gained insights and acquired competencies to real-world innovation management challenges across five major stages of the innovation value chain from strategy development and idea generation to commercial concept and product development and successful market establishment, as well as sustainable growth in various contexts.

The *MPS in Technology Entrepreneurship* is committed to teaching the disciplines of entrepreneurial thinking that produce not just entrepreneurial inspirations but an entrepreneurial frame of mind. Courses are offered during 12-week terms; students complete course work in 11 weeks; week 12 is reserved for finals. The 30-credit, 9-course graduate program may be completed in as little as 15 months by enrolling in two 3-credit courses in the first four 12-week terms and a 6 credit capstone course in the final term.

Offered through the convenience and flexibility of the online learning environment, the program enables student to:

- Think beyond current paradigms in order to discover innovation needs and to envision impact through strategic idea and concept development (Term 1).
- Leverage ideas to create sustainable business models aligned with customer needs and wants in competitive marketplaces (Term 2).
- Manage commercialization challenges and market launch efficiently and effectively (Term 3).
- Navigate the legal aspects of product development and company launch and build sound financial and accounting strategies and practices (Term 4).

- Know how to accelerate growth and create sustainable value through appropriate business development, risk management, financing, and value extraction strategies (Term 5).

Contact

Office of Extended Studies
0132 Main Administration Building
7901 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7762
Email: oes@umd.edu

Website: http://ter.ps/mpte

Courses: ENES

Relationships: **Corporate Innovation (MPCI)** (p. 141) **Technology Entrepreneurship (Z103)** (https://academiccatalog.umd.edu/graduate/programs/technology-entrepreneurship-z103)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For complete Admission Information, please visit: http://oes.umd.edu/professional-programs/technology-entrepreneurship/application-information

Admitted students participate 100% as online students. **Immigration documents (F1 or J1 student visas or an I-20) are not required or issued for this fully online program.** In addition to the above minimum qualifications, international students and applicants with foreign credentials have additional requirements per the Office of International Student & Scholar Services (ISSS). For additional requirements, please visit: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-technology-entrepreneurship

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	31 July	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	31 July	14 Dec

Other Deadlines: Please visit the program website at http://ter.ps/mpte

Requirements

- Technology Entrepreneurship, Master of Professional Studies (M.P.S.) (p. 407)

Technology Entrepreneurship, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
Required courses:		
ENES662	Innovative Ideas and Concept Development	3
ENES663	Strategies for Managing Innovation	3
ENES664	Business Modeling and Customer Validation	3
ENES665	Innovative Thinking	3
ENES666	Creative Design, Prototyping, and Testing	3
ENES667	Market Development and Commercialization	3
ENES670	Financial Management and New Venture Financing	3
ENES671	Legal Aspects of Entrepreneurship	3
ENES672	Launching Technology Startup Ventures	6
Total Credits		30

Technology Ventures and Innovation (Z068)

Graduate Certificate Program
College: Engineering

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.mtechventures.umd.edu

Admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.mtechventures.umd.edu

Requirements

- Technology Ventures and Innovation, Post-Baccalaureate Certificate (P.B.C.) (p. 408)

Technology Ventures and Innovation, Post-Baccalaureate Certificate (P.B.C.)

This program is not currently accepting applications.

Telecommunications (ENTS)

Graduate Degree Program
College: Engineering

Abstract

The Master's in Telecommunications Program offers students a unique opportunity to engage in cross-disciplinary coursework from both the Electrical and Computer Engineering Department of the A. James Clark School of Engineering and the Robert H. Smith School of Business at the University of Maryland. This extraordinary combination culminates in a degree that prepares students for the broad range of rigors and issues that encompass the dynamic telecommunications industry.

The program covers several different areas including Information System Security, Wireless Communications, Networking, and Business and Management for the telecommunications industry. The program may be pursued either full-time or part-time. All courses are scheduled in the evening to suit working professionals, while some courses additionally offer daytime sections.

The program is designed around a core curriculum that provides a solid technical foundation and management background. The Master's in Telecommunications degree requires successful completion of 30 credits and a scholarly paper. Please visit our Degree Requirements (http://www.telecom.umd.edu/degree-requirements) page for detailed information.

Students may choose from a wide range of electives to develop their interests and complement their career goals. Please visit our Course Descriptions (http://telecom.umd.edu/courses) page for a detailed listing of our courses. In addition to the courses listed there, special topics electives are regularly offered. As our program keeps up with industrial trends, these courses focus on emerging, cutting-edge topics.

Please see our website, www.telecom.umd.edu, for the most current information.

Financial Assistance

Since the Master's in Telecommunications Program does not normally offer financial support in the form of graduate assistantships, many of our students find assistantships in other units, especially non-academic units, which do not have graduate students.

Contact

Master's in Telecommunications Program Office
2433 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu

Courses: ENTS

Relationships: Electrical and Computer Engineering (ENEE) (p. 168)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

For the most current and detailed information regarding admissions and deadlines for the Master's in Telecommunications, please refer to our Admissions (http://telecom.umd.edu/why-apply) page.

The program is open to applicants holding a regionally accredited baccalaureate degree in engineering, computer science, math, physics or related technical fields with a minimum GPA of 3.0. Applicants with an undergraduate GPA of slightly less than 3.0 may be considered if they have demonstrated strong performance in prior graduate study and/or professional experience.

This program is professional in nature and has a non-standard tuition. Tuition for the 2017-18 academic year is $1,037.00 per credit. The tuition rate is the same for all students, regardless of residency or citizenship.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	1 May	28 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://www.telecom.umd.edu

Requirements

- Telecommunications, Master of Science (M.S.) (p. 409)

Facilities and Special Resources

The ENTS program has a number of state-of-the art laboratory facilities where students enhance their hands-on skills and gain practical experience using, configuring and operating telecom lab equipment. (link: https://telecom.umd.edu/lab-facilities). These labs include the Communications Laboratory, the Networking Laboratory, and the Telecommunications PC Lab,

Telecommunications, Master of Science (M.S.)

Non-thesis only (scholarly paper required): 30 credits

Requirements to earn the Master's in Telecommunications degree include completing 30 credit hours of course work, achieving a cumulative grade point average (GPA) of at least 3.0, and submitting a satisfactory scholarly paper. The 30 credits include eight required courses and two elective courses. All graduate students at the University of Maryland are required to maintain a 3.0 GPA each semester to remain in good standing.

Additional courses beyond the required courses must be approved by the Program Office and should not impede the student's progress towards degree completion. ALL courses taken at the University of Maryland count towards the student's cumulative GPA.

Course	Title	Credits
Required courses:		
ENTS622	Introduction to Digital Communication Systems	3
ENTS640	Networks and Protocols I	3
ENTS641	Networks and Protocols II	3
ENTS625	Management and Organizational Behavior in the Telecommunications Industry	3
ENTS630	The Economics of International Telecommunications	3
ENTS632	Telecommunications Marketing Management	3
ENTS635	Decision Support Methods for Telecommunication Managers	3
Select one additional approved core course		3
Electives		6
Students must also complete a scholarly paper by the time of graduation		
Total Credits		30

Terrorism Analysis (Z039)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The National Consortium for the Study of Terrorism and Responses to Terrorism (START) is dedicated to training and mentoring a new generation of scholars and analysts capable of examining questions related to the behavior of terrorists and terrorist groups and to the issue of how societies can best prepare for dealing with a terrorist threat or responding to a terrorist attack. START's Graduate Certificate in Terrorism Analysis provides participants with advanced education on the causes, dynamics and impacts of international and domestic terrorism. Participants also develop the methodological skills necessary to pursue advanced research on and analysis of terrorism. The program consists of four required courses. Each course is offered once per calendar year, in an online, synchronous learning environment. The program can be completed in as little as 12 months to 24 months.

The program is appropriate for individuals interested in (and/or currently) working in fields related to intelligence analysis, homeland security analysis, or analysis of other relevant topic areas; and individuals interested in (and/or currently) conducting scholarly research on terrorism and responses to terrorism.

Financial Assistance

START does not currently provide financial assistance to Graduate Certificate students.

Tuition

- Initial application fee: $75
- Tuition and fees per course: $2,100

Please note: Students are responsible for purchasing their own books, software, and other supplies as required by each instructor. Students may be required to pay additional UMD student fees.

Contact

Joyce Rasing
Graduate Education Program Coordinator
National Consortium for the Study of Terrorism and Responses to Terrorism
8400 Baltimore Avenue, Suite 250
College Park, MD 20740
Telephone: 301.405.2576
Email: education@start.umd.edu

Website: http://www.start.umd.edu

Courses: BSST

Keywords: Terrorism Reasearch, Terrorism Studies, Terrorism Analysis, Research Methods in Terrorism Studies, Terrorism Graduate Certificate, Terrorism and Education, START Education programs, START Gradurate Certificate, Terrorist Motivations and Behaviors, Impacts of and Responses to Terrorism, Development of counterterrorism, Research Methods in Terroism Studies.

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Eligible applicants must have earned a 4-year baccalaureate degree from a regionally-accredited U.S. institution, or an equivalent degree at a

foreign university. A 3.0 GPA is preferred, but experience may substitute. GRE scores are not required. All applications must be submitted via the online application available at: www.gradschool.umd.edu/gss/admission.html. All application materials must be received by the deadlines as described below.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	11 Jan
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	11 Jan

Other Deadlines: Please visit the program website at http://www.start.umd.edu

Requirements

- Terrorism Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 410)

Facilities and Special Resources

The START Consortium at the University of Maryland has pulled from its extensive experience in the field of terrorism research and analysis in order to formulate the Graduate Certificate curriculum. Students are drawn from the academic and professional worlds, which brings a range of perspectives to the virtual classroom. Its goal is to provide a well rounded and sophisticated approach to the subject matter and to cultivate a stimulating learning environment.

Terrorism Analysis, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
BSST630	Motivations and Intents of Terrorists and Terrorist Groups	3
BSST631	Societal Impacts of and Responses to Terrorism	3
BSST636	Quantitative Research Methods in Terrorism Studies	3
or BSST637	Qualitative Research Methods in Terrorism Studies	
Choose one of the following electives:		3
BSST634	Legal and Criminal Approaches to Counterterrorism	
BSST635	Countering Violent Extremism: Policy and Practice	
BSST638	Special Topics in Terrorism Studies (BSST638J - Disaster Recovery in Japan)	
BSST638	Special Topics in Terrorism Studies (BSST638S - Countering Violent Extremism and Deradicalization in International Contexts)	
BSST670		
BSST671		
BSST672		
BSST699	Independent Study in Terrorism Studies (BSST699G - Geospatial Analysis of Terrorism)	
BSST699N	(BSST699N - Social Network Analysis of Terrorism)	
BSST699W	(BSST699W - Introduction to Wargaming)	
Total Credits		12

Theatre Design (MFAT)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Theatre, Dance, and Performance Studies offers a three-year Master of Fine Arts degree in Theatre Design, with concentrations in costume, scenic, lighting and multimedia. The degree offers superior students advanced training in design with on-campus and off-campus opportunities for creative activity. The program prepares the student to enter the professional theatre or to teach in the creative areas at colleges or universities. The School also offers MA and PhD degrees in theatre history and performance studies, and MFA degree in Dance, For more information visit the School website at http://tdps.umd.edu.

Financial Assistance

The School nominates outstanding applicants for competitive University fellowships. Teaching assistantships are available to a limited number of students. The Graduate program head will discuss these with accepted students at the time of acceptance.

Contact

Crystal Gaston
Coordinator of Graduate Services
Theatre, Dance, and Performance Studies
2808 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6675
Email: cgaston@umd.edu

Misha Kachman
Associate Professor
Theatre, Dance, and Performance Studies
2739 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6639
Email: mkachman@umd.edu

Website: http://tdps.umd.edu/programs/mfa-design

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Portfolio: A sample of work submitted through a professional website, or via a file – uploaded to the Multimedia Requirement section of the application.
- Applicants interested in multimedia design: Should select lighting design as their area of interest on the online application.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	16 May
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	7 Mar

Other Deadlines: Please visit the program website at http://tdps.umd.edu/programs/mfa-design

Requirements

- Theatre Design, Master of Fine Arts (M.F.A.) (p. 411)

Facilities and Special Resources

The School of Theatre, Dance, and Performance Studies is housed in the Clarice Smith Performing Arts Center at Maryland. This state-of-the-art facility includes the 650-seat Ina and Jack Kay Theatre, the 200-seat Robert and Arlene Kogod Theatre and the 100-seat Cafritz Theatre.

The campus is within a few miles of the John F. Kennedy Center for the Performing Arts, Arena Stage, the National Theatre, Ford's Theatre, The Shakespeare Theatre at the Lansburgh, and the Olney Theatre Center, which are among more than 80 professional area theatres. Two of the greatest libraries in the world, the Library of Congress and the Folger Shakespeare Library, are in close proximity to campus. Students also make regular use of the Smithsonian Institution, the Federal Theatre Project Archives, the National Archives, and more than 50 specialized libraries and institutions in the Washington metropolitan area.

Theatre Design, Master of Fine Arts (M.F.A.)

Total Credits: Minimum of 60 credits required

Student designers must present and pass three formal design portfolio reviews, at the conclusion of their second, fourth, and sixth semesters in the program. In addition, portfolio interviews take place at the end of the first, third, and fifth semesters. Design portfolios include studio projects as well as fully realized academic and professional scenic, costume, or lighting designs. The fourth semester portfolio review will include an evaluation of a pre-thesis design project (usually a fully realized design, but may include independent study design projects). The pre-thesis design project, in preparation for the thesis, will include a written component. Successful completion of the portfolio reviews will result in the assignment of the thesis project.

Portfolio requirements

Successful completion of the portfolio review will result in the assignment of pre-thesis (after the first year) and thesis (after the second year) projects. Upon completion of each portfolio review, the candidate will receive a formal letter indicating a grade of pass, conditional pass, or fail. In the event of a conditional pass or fail, the faculty may require the candidate to complete additional projects or coursework.

First year portfolio should include:

- A current resume
- Projects from primary and secondary design emphasis courses
- Craft projects from foundation component courses
- Production photographs illustrating realized craft or design work for projects produced by the School or by professional theatres
- Supporting materials, drawings, and photographs that demonstrate effective and productive work as a design assistant (academic or professional projects)

Second year portfolio should include:

- A current resume
- Projects from primary and secondary design emphasis courses
- Production photographs illustrating realized craft or design work for projects produced by the School or professional theaters
- Supporting materials, drawings, and photographs that demonstrate effective and productive work as a design assistant (academic or professional projects)
- A written design analysis and supporting research material for the pre-thesis project that should follow the form of the first chapter of the written component of the thesis project

For their thesis, M.F.A. design students create and realize a scenery, costume, or lighting design for a major production. Each student must meet all deadlines for that production and the design and execution must be acceptable to all members of her/his thesis committee. The written component of the thesis includes all relevant visual material, including research images, drawings, renderings, and production photographs.

M.F.A students typically design three or four productions in our main season during their three years in residence. The first year of study includes several assistant design assignments. We plan our productions at least one semester in advance; therefore, there is a good possibility that students will be designing their first main season production in the spring semester of the first year. We produce five main season shows and approximately five student produced productions per academic year. M.F.A. students also have the opportunity to work with our award-winning faculty on professional projects within the Washington metropolitan theatre community, as well as work in regional theatres, off-Broadway and Broadway.

An exciting feature of the MFA in Design program in the School of Theatre, Dance, and Performance Studies is the annual public portfolio exhibit and review. Each year the Cafritz Theatre is transformed into a gallery where all MFA Design students display their set, costume, and lighting designs.

A multi-day affair, the first day is open to the general public when professional designers and directors from the Washington, DC theatre

community have an opportunity to respond to student work and where students often make important professional contacts. The second day involves longer one-on-one critique sessions with the nation's leading designers and directors.

In the past few years our respondents have included designers and directors such as **Paloma Young, Donyale Werle, Jeff Croiter, Ming Cho Lee, John Lee Beatty, David Korins, Ken Posner, Linda Roethke, Serge Seiden, Joy Zinnoman, John Iacovelli, Aaron Posner, James Kronzer, Mary Zimmerman, Jim Ingalls, and Anna Kuzmanic.**

Curriculum Requirements

Students choose from one of the following specializations: Costume Design, Scene Design, Lighting Design, or Projected Design. Teaching Assistants should complete one credit of THET606. Course requirements are as follows:

Course	Title	Credits
Core Requirements		30-36
THET465	History of Fashion for the Theatre	
THET6xx	Introduction to Theatre Design	
THET670	Period Style for the Theatre: Fashion and Decor	
THET788	Master's Tutorial	
THET789	Master's Practicum	
THET799	Master's Thesis Research	
Studio:		15-18
THET649	Advanced Design Studio in Costume	
THET639	Advanced Design Studio in Scenery	
THET659	Advanced Design Studio in Lighting	
THET678	Theory of Visual Design For the Performing Arts	
Electives		6-15
Select additional electives chosen with your advisor		
Specialization Options:		
Costime Design		
Scene Design		
Lighting Design		
Projected Design		

Theatre and Performance Studies (THPF)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Theatre, Dance, and Performance Studies offers a Master of Arts in Theatre and Performance Studies and Doctor of Philosophy in Theatre and Performance Studies (THPF). For more information visit the School website at http://tdps.umd.edu/programs/phd-theatre-and-performance-studies. The School also offers graduate degrees in MFA in Theatre Design and MFA in Dance.

The M.A. program is designed to enhance and develop students' practical, historical, and critical knowledge of theatre so that they may go on to graduate work in Ph.D. or M.F.A programs, or upgrade their skills for high-school teaching. The School's application deadline for best consideration for the MA program and the PhD program is January 15. Applications fully submitted by February 1 may also receive consideration on a space available basis.

The doctoral program in Theatre and Performance Studies is an interdisciplinary course of study that prepares students for careers as educators, professors in higher education, publishing scholars, and cultural critics. The program offers a rigorous exploration of both Theatre History and Performance Studies through the critical and theoretical analyses of historical archives, dramatic and performance texts, and cultural behavior as performance. Applicants who do not hold an undergraduate or graduate degree in theatre (or an equivalent field), may be required to take preparatory coursework prior to admission into the Ph.D. program.

Financial Assistance

The School nominates outstanding applicants for competitive University fellowships. Teaching assistantships are available to a limited number of students. The Graduate program head will discuss these with accepted students at the time of acceptance.

Website: http://tdps.umd.edu

Contact

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Courses: TDPS THET

Keywords: M.A.: Theatre and Performance Studies. Ph.D.: Theatre and Performance Studies.

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

- Writing Sample: A 10 – 15 page paper demonstrating ability to do university level research – uploaded to the Uploads Requirement section of the application.
- Publications/Presentations (optional)

Applicants must have earned a 4-year baccalaureate degree from a regionally-accredited U.S. institution, or an equivalent degree earned at a non-U.S. institution with at least a 3.0 GPA. Applicants for the PhD must also have earned MA or MFA degree from a regionally-accredited U.S. institution, or an equivalent degree earned at a non-U.S. institution with at least a 3.0 GPA. All International students must show evidence of acceptable scores on the Test of English as a Foreign Language (TOEFL (https://www.ets.org/toefl)). See information on the International Educational Services website for specific admissions requirements (http://globalmaryland.umd.edu/offices/international-students-scholar-services), including minimum TOEFL score.

Our PhD program also requires the Graduate Record Exam (GRE (https://www.ets.org/gre)). Scores must be less than five years old. (Use institutional score reporting code 5814.)

We expect scores above the 80th percentile on the Verbal Reasoning and Analytical Writing portions of the exam. We do not consider the quantitative reasoning score in our admissions process.

Generally, our successful applicants have GRE scores well above the 80th percentile but this is not always the case. In making determinations on admissions our committees consider many other factors including, but not limited to, the quality and source of the letters of reference, success in previous programs as indicated by transcripts, the strength of the researched writing sample, the interest generated in the faculty by the statement of goals, how the applicants research interests might have a synergy with the work currently being done by our students, the intellectual diversity the applicant might bring to the program.

Please consider that we are a program of Theatre and Performance Studies and that our students study both areas, not one or the other. Include information on what attracts you to scholarship (as opposed to the professional training you might receive in an MFA program), what attracts you to our program (which faculty member or members would you most want to work with, for example) and what your primary research interests are. Consider too that we are dedicated to developing scholar/artists so indicate what practical areas your skills are in or how you hope to develop such skills while engaged in rigorous scholarly work. How might you use this degree in the future if it does not lead directly to a job in higher education?

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Preferred: 17 Jan / Final: 7 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Preferred: 17 Jan / Final: 7 Feb

Other Deadlines: Please visit the program website at http://www.tdps.umd.edu

Requirements

- Theatre and Performance Studies, Doctor of Philosophy (Ph.D.) (p. 414)
- Theatre and Performance Studies, Master of Arts (M.A.) (p. 413)

Facilities and Special Resources

The School of Theatre, Dance, and Performance Studies is housed in the Clarice Smith Performing Arts Center at Maryland. This state-of-the-art facility includes the 650-seat Ina and Jack Kay Theatre, the 200-seat Robert and Arlene Kogod Theatre and the 100-seat Cafritz Theatre.

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Theatre and Performance Studies, Master of Arts (M.A.)

Thesis option: minimum of 36 credits
Non-thesis option: minimum of 36 credits

The Department offers both the thesis and non- thesis options. All students undertaking the M.A. degree must pass a six-hour comprehensive examination on theatre history and criticism, performance and directing, and design and technical theatre. Please contact the Head of History/Theory to get more details.

Course	Title	Credits
Required courses:		
THET600	Introduction to Graduate Research Methods	3
THET606	Teaching Theatre [1]	1
Thesis or Non-Thesis Requirements		
Select one of the following options:		32
Thesis:		
THET799	Master's Thesis Research	
Non-Thesis:		
Students are required to submit two article-length essays to the Non-thesis Examining Committee		
Total Credits		36

[1] All Teaching Assistants must take THET606.

Students should consult with their advisor to determine the remainder of their coursework.

Theatre and Performance Studies, Doctor of Philosophy (Ph.D.)

Students are required to complete a set of core courses, electives, and dissertation research. In addition, students must fulfill the production/performance requirement and language requirement.

Members of the student's comprehensive examination committee write the questions. Area questions are designed to interrogate both literary and performance issues. Selected by the student and her/his advisor, the examination committee consists of the advisor and at least two members of the core and/or affiliate faculty. Exams may be taken one of two ways: in-house or take home with an oral defense. The examinations are based on course work and reading lists. All students are responsible for a core reading list of approximately 15-20 books and articles. In addition to the core reading lists, each student will be responsible for developing a reading list of no less than 50 books and articles reflective of the student's dissertation topic and tailored to his/her interests as they relate to the examination areas. Students devise these lists in consultation with the members of her/his committee. Students have two opportunities to pass the comprehensive examinations. Please note that the examinations are only offered at specific times each semester and that students must plan to take the comprehensive exams during these times.

All doctoral students will engage in original research (in some cases, complemented by appropriate non-print documentation), the result of which is a book-length manuscript. In consultation with her/his advisor, the student selects a five-member dissertation committee. At least three committee members must be permanent members of the University of Maryland Graduate Faculty and each committee must have a chairperson who is a permanent member of the graduate faculty. Please note that the Dean's Representative on the committee may not be a member of the History/Theory Area, but must be from another department at the University of Maryland. In rare cases, students will need an expert in an area not represented by the History/Theory Faculty. Students are reminded that these members must be present at the defense and that the Department cannot guarantee to fund the travel of committee members from other universities.

Each doctoral student must defend her/his dissertation orally as a requirement in partial fulfillment of the doctoral degree. Dissertations must follow the guidelines established by the University. Please see the Graduate Student Handbook (available online through the Graduate School) for guidelines on committee selection and defense procedures.

Please contact the Head of History/Theory area, Esther Kim Lee, eklee@umd.edu, directly for more information.

Course	Title	Credits
Required courses:		
THET606	Teaching Theatre [1]	1
THET700	Introduction to Doctoral Studies in Theatre	3
THET711	Critical Theory	3
THET712	Historical Research Methods and Historiography in Theatre	3
THET713	Performance Studies	3
Select electives within the School of Theatre Dance and Performance Studies		12
Select electives outside of the School of Theatre Dance and Performance Studies		6
Comprehensive Exams:		
History of Drama and Performance		
Theory of Drama and Performance		
Dissertation Prospectus		
Dissertation Research Requirements		
THET899	Doctoral Dissertation Research	12
Total Credits		43

[1] All teaching assistants should complete one credit of THET606.

Toxicology (TOXI)

Graduate Degree Program
College: Public Health

Abstract

The Doctoral Program in Toxicology and Environmental Health at the Maryland Institute for Applied Environmental Health **(MIAEH)** is part of the University of Maryland System-Wide Graduate Program in Toxicology. Our students focus on chemical, biological and/or physical exposures and the related physiological and environmental vulnerabilities and susceptibilities. Students will master an essential core of knowledge in toxicology and environmental and occupational health, exposure sciences, risk assessment, epidemiology, and biostatistics. The consequences of the built environment and environmental injustice are a critical part of the overall program. Elective courses and rotations with faculty-led field studies and laboratories, offer students the background and tools needed to specialize within the broader area of toxicology and applied environmental public health. **Applicants should review faculty interests and establish a dialogue (email/phone) with one or more faculty before applying.**

MIAEH additionally offers a Masters of Public Health **(MPH)** Program in Environmental Health Sciences (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?MIEH) and supports a **PhD program in Environmental Epidemiology** (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?EPID).

Financial Assistance

MIAEH seeks to provide Financial Assistance for all accepted students on the PhD program, this usually takes place through early Spring via faculty / school level discussions for each applicant.

Contact

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Website: http://sph.umd.edu/department/miaeh

Relationships: Environmental Health Sciences (MIEH) (p. 191) **Epidemiology (EPID)** (p. 196)

Admissions

Applications should be submitted through the Schools of Public Health Application Service, (SOPHAS), at www.SOPHAS.org (http://www.SOPHAS.org). Remember to designate the **University of Maryland School of Public Health, College Park** (SOPHAS Code 0485) as one of your school choices along with your desired program. SOPHAS will verify submission, and if complete, SOPHAS will inform the University of Maryland Graduate School. The verification process can take 4-6 weeks to complete. We do not accept materials outside of the SOPHAS process. The University of Maryland Graduate School requires a Supplemental Application and a Supplemental Application Fee of $75 for each program. This request will be made by the Graduate School once your SOPHAS information is verified by SOPHAS. MIAEH will be able to review ONLY after both stages above are complete, thus there may be a some delay in you submitting and getting a final decision.

PhD Admissions Criteria

- Minimum 3.0 undergraduate GPA; outstanding performance in relevant courses
- Completion of a relevant master's degree
- Official GRE scores may be waived for students with previous advanced degrees, please contact the department to discuss GRE requirements.
- Three letters of recommendation that address academic capabilities. The statement of purpose should address each of the following questions:

    1. describe your specific areas of interest within environmental health;
    2. which primary faculty members in the Maryland Institute of Applied Environmental health do you think most closely share your areas of interest;
    3. what previous experiences have influenced your decision to pursue a degree in environmental health;
    4. how do you believe UMD's program will help you reach your career goals; and
    5. how do you see yourself using this degree in the five years following graduation?

- Relevant academic/work experience, including previous coursework in human biology or physiology, demonstration of proficiency in environmental health, statistical methods and statistical software, and research presentation or publication experience.

Applicants are strongly recommended to communicate with our faculty in their area(s) of interest before applying.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 16 Nov / Final: 15 Feb	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority: 16 Nov / Final: 15 Feb	N/A

Other Deadlines: Please visit the program website at http://sph.umd.edu/department/miaeh

Requirements

- Toxicology and Environmental Health, Doctor of Philosophy (Ph.D.) (p. 415)
- Toxicology, Master of Science (M.S.) (p. 416)

Facilities and Special Resources

The proximity of the University of Maryland, College Park to the nation's capital offers prospective students unparalleled opportunities for internships and research experiences in public health, including placements at the National Institutes of Health, the CDC Washington Office, the U.S. Department of Health and Human Services, Children's National Medical Center, the Maryland Department of Health and Mental Hygiene, and many other national, state, and local health agencies. The diversity of cultural and socioeconomic groups, communities, industries, and health organizations provides a rich environment for learning, research, public policy analysis, and service.

Toxicology and Environmental Health, Doctor of Philosophy (Ph.D.)

The PhD in Toxicology and Environmental Health requires a minimum of 46 credits, in addition to 12 credits of TOXI899. Students are also required to complete a minimum of 12 credits in two areas of specialization (six credits in each), included in the 46 credit total.

The PhD program consists of a minimum of 46 credit hours of graduate courses, in addition to 12 credits of Doctoral Dissertation Research. The two areas of specialized focus could be in areas like Advanced Epidemiology/Biostatistics, Analytical Chemistry, Pharmacology, Pathology/Immunology/Microbiology, or Environmental Science/Ecology/Climate. Program requirements for a PhD degree in toxicology also include successful completion of a written and oral comprehensive exam in the format of an NIH research proposal, oral defense of a written dissertation research proposal, and a minimum of 12 credits of PhD dissertation research, written dissertation, and a final dissertation defense. The program can be completed on either a full- or part time basis. It is anticipated that students will complete more than the minimum number of credits.

Course	Title	Credits
Required courses:		
MIEH720	Principles of Toxicology	3
MIEH740	Environmental Health Risk Assessment	3
MIEH770	Law and Policy in Environmental Health	3

MIEH771	Exposure Assessment of Environmental Hazards	3
EPIB610	Foundations of Epidemiology	3
EPIB611	Intermediate Epidemiology	3
EPIB650	Biostatistics I	3
EPIB651	Applied Regression Analysis	3
EPIB641	Public Health and Research Ethics	1
TOXI609	Methods in Toxicology	6
MIEH688	Seminar in the Maryland Institute for Applied Environmental Health: Current Topics in Environmental Health	3
HLTH665	Health Behavior I	3
HLSA601	Introduction to Health Systems	3
Specialization one courses		6
Specialization two courses		6
Dissertation Research Requirements		
TOXI899	Doctoral Dissertation Research	12
Total Credits		64

Toxicology, Master of Science (M.S.)

The M.S. program in Toxicology does not directly admit students.

Translation (MPTR)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Master of Professional Studies in Translation (MPS in Translation) is designed to equip students with the required competencies to compete successfully for work as specialized translators, project managers, or administrators of language services.Example skills include the translation of specialized texts in health, legal and political settings, including the translation of documents and websites for major corporations, international organizations, and government ministries.

The MPS in Translation is a two-year, 41 credit program. In the first year, you begin to develop high-level skills in translation in specific domains (specialized written texts). In the program's second year, you build on these fundamental skills, specializing in written communication for governmental and international organizations.

Contact

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Website: http://www.gsit.umd.edu

Relationships: Consecutive Interpreting (Z080) (p. 140) **Interpreting (MPIN)** (p. 263) **Translation (Z079)** (p. 417)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (http://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105andz106.pdf)
- Proof of residency: A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.
- Admissions tests (contact oes@umd.edu)

For complete Admission Information, please visit: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/interpreting-and-translation-gsit/apply

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 May
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar

Other Deadlines: Please visit the program website at http://www.gsit.umd.edu

Requirements

- Translation, Master of Professional Studies (M.P.S.) (p. 416)

Translation, Master of Professional Studies (M.P.S.)

41 credits required

Students select either the Translation track or the Translation and Localization Project Management track. In either track, students can focus on two languages or three.

Regardless of track or number of languages, all MPTR students must complete the following courses:

Course	Title	Credits
Core Requirements		
COMM610	Introduction to Translation and Interpreting Studies	3
COMM683	Intercultural Communication Theory	3
COMM789	Seminar: Special Topics in Intercultural Communication	3
COMM669	Professional Practice Forum in Translation: Practicum	1
COMM730	Seminar in Health Communication	3
or COMM762	The Rhetoric of Political Institutions	
Additional course requirements [1]		28
Total Credits		41

[1] Students should check the department website for the remainder of their course requirements. The remainder of the course requirements vary based on the student's track and number of languages.

Translation (Z079)

Graduate Certificate Program
College: Arts and Humanities

abstract

The Graduate Certificate in Translation provides one-year, 21-credit of full-time core training in the fundamental skills of translation, translation for specific domains, translation studies, the translation profession, intercultural communication, and background knowledge in at least one of the following communication contexts: political communication, legal communication, health communication, or specific domains that correspond to demands of specific language markets. Students enroll in 10 to 11-credits in the fall semester; 10 to 11-credits in the spring semester as detailed in the **GC-Translation Plan of Study** (https://oes.umd.edu/sites/oes.umd.edu/files/OES/PGP/GSIT/gsit_plan_gc_translation.pdf).

Contact

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Website: http://www.gsit.umd.edu

Relationships: Consecutive Interpreting (Z080) (p. 140) Interpreting (MPIN) (p. 263) Translation (MPTR) (p. 416)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (http://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105andz106.pdf)
- Proof of residency: A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.
- Admissions tests (contact oes@umd.edu)

For complete Admission Information, please visit: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/interpreting-and-translation-gsit/apply

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 May
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar

Other Deadlines: Please visit the program website at http://www.gsit.umd.edu

Requirements

- Translation, Post-Baccalaureate Certificate (P.B.C.) (p. 417)

Translation, Post-Baccalaureate Certificate (P.B.C.)

The Graduate Certificate of Professional Studies in Translation (GCPS in Translation) is designed to equip you with the knowledge and skills required for entry-level work in the translation profession. Examples include serving as translators of general texts for information purposes and specialized texts in subject areas wherein you hold advanced qualifications (e.g., Master of Arts degree, and/or significant professional expertise). You will be grounded in the tenets of the profession, including professional conduct and ethics and guided through the steps needed to advance your professional skill set.

The GCPS in Translation is a 21-credit one year program, offering instruction in the fundamental skills of translation and includes the theoretical fields of translation studies, the translation professions, intercultural communication, and background knowledge in at least one of the following communication contexts: political communication, legal communication, or health communication.

two languages track

Course	Title	Credits
COMM610	Introduction to Translation and Interpreting Studies	3
COMM639	Fundamentals of Translation	4
COMM683	Intercultural Communication Theory	3
COMM649	Translation for Specific Domains	4
Select four credits of the following courses:		4
COMM609	Fundamentals of Interpreting	
COMM641	Introduction to Computer-Assisted Translation	
COMM798	Independent Study (COMM798F - English Fluency Enhancement)	
COMM798	Independent Study (COMM798G - Editing in English Writing)	
COMM798	Independent Study (Intensive Writing)	
COMM798	Independent Study (Public Speaking)	
Select four credits of the following courses:		4
COMM629	Introduction to Simultaneous Interpretation	
COMM730	Seminar in Health Communication	
COMM762	The Rhetoric of Political Institutions	
COMM619	Consecutive Interpretation	
COMM798	Independent Study (COMM798F - English Fluency Enhancement)	
COMM798	Independent Study (COMM798G - Editing in English Writing)	
COMM798	Independent Study (Intensive Writing)	
COMM798	Independent Study (Public Speaking)	
Select one of the following courses:		3
COMM730	Seminar in Health Communication	
COMM762	The Rhetoric of Political Institutions	
Total Credits		25

THREE LANGUAGES TRACK

Course	Title	Credits
COMM610	Introduction to Translation and Interpreting Studies	3
COMM639	Fundamentals of Translation	6
COMM683	Intercultural Communication Theory	3
COMM649	Translation for Specific Domains	6
Course selection depends on language combination:		3 credits minimum
COMM609	Fundamentals of Interpreting	
COMM641	Introduction to Computer-Assisted Translation	
COMM798	Independent Study (COMM798F - English Fluency Enhancement)	
COMM798	Independent Study (COMM798G - Editing in English Writing)	
COMM798	Independent Study (Intensive Writing)	
COMM798	Independent Study (Public Speaking)	
COMM629	Introduction to Simultaneous Interpretation	
COMM730	Seminar in Health Communication	
COMM762	The Rhetoric of Political Institutions	
COMM619	Consecutive Interpretation	
COMM798	Independent Study (COMM798F - English Fluency Enhancement)	
COMM798	Independent Study (COMM798G - Editing in English Writing)	
COMM798	Independent Study (Intensive Writing)	
COMM798	Independent Study (Public Speaking)	
COMM730	Seminar in Health Communication	
COMM762	The Rhetoric of Political Institutions	
Total Credits		18-21

Transportation Policy and Planning (Z030)

Graduate Certificate Program
College: Architecture

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.oes.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	not currently accepting applications	not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	not currently accepting applications	not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oes.umd.edu

Requirements

- Transportation Policy and Planning, Post-Baccalaureate Certificate (P.B.C.) (p. 418)

Transportation Policy and Planning, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Transportation Systems (online) (METS)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments. Late afternoon, evening, and 100% online classes are taught by the College Park faculty and experienced adjunct faculty at the College Park campus and designated learning centers in Maryland. For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines (https://fafsa.ed.gov/deadlines.htm).

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://academiccatalog.umd.edu/graduate/programs/transportation-systems-online-mets/http:/gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (3)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for the campus programs (http://gradschool.umd.edu/engineering/meng-campus).

Full admission as a degree seeking student requires the following prerequisites:

- A bachelor's degree, GPA of 3.0 or better, in engineering or science from an accredited institution.
- Completed applications are reviewed on a case-by-case basis. Please visit the department website (http://advancedengineering.umd.edu/oaee-graduate-admissions) for more information.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	This program is not currently accepting applications	This program is not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	This program is not currently accepting applications	This program is not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Transportation Systems, Master of Engineering (M.Eng.) (p. 420)

Facilities and Special Resources

Courses in the Professional Master of Engineering program are currently offered on the College Park campus, at off-campus centers via video-teleconferencing, and 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, the University Center of Northeastern Maryland in Harford County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Transportation Systems, Master of Engineering (M.Eng.)

30 credits required

Students complete all six core courses and then choose four electives from the Technical Electives list.

Course	Title	Credits
Required courses:		
ENCE670	Highway Traffic Characteristics and Measurements	3
ENCE672	Regional Transportation Planning	3
ENCE673	Urban Transportation	3
ENCE677	OR Models for Transportation Systems Analysis	3
ENCE688	Advanced Topics in Civil Engineering (ENCE6881 - Discrete Choice Analysis)	3
ENCE688	Advanced Topics in Civil Engineering (ENCE688T - Transportation Network Algorithms and Implementations)	3
Technical Electives		
Select four of the following:		12
ENCE627	Project Risk Management	
ENCE666	Cost Engineering and Control	
ENCE667	Project Performance Measurement	
ENCE674	Urban Transit Planning and Rail Transportation Engineering	
ENCE688	Advanced Topics in Civil Engineering	
ENCE688	Advanced Topics in Civil Engineering (ENCE688Q - Transportation Economics)	
Total Credits		30

Transportation Systems (online) (Z102)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is a practice-oriented part-time graduate program designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments. Late afternoon, evening, and 100% online classes are taught by the College Park faculty and experienced adjunct faculty at the College Park campus and designated learning centers in Maryland.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines (https://fafsa.ed.gov/deadlines.htm).

Contact

Anna Damm
Coordinator for Admission and Recruitment
Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: adamm1@umd.edu

Website: http://www.advancedengineering.umd.edu

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Full admission requires the following prerequisites:

- A bachelor's degree, GPA of 3.0 or better, in engineering or science from an accredited institution.
- Completed applications are reviewed on a case-by-case basis. Please visit the department website (http://advancedengineering.umd.edu/oaee-graduate-admissions) for more information.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	This certificate is not currently accepting applications	This certificate is not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

Other Deadlines: Please visit the program website at http://www.advancedengineering.umd.edu

Requirements

- Transportation Systems, Post-Baccalaureate Certificate (P.B.C.) (p. 421)

Facilities and Special Resources

Courses in the Professional Master of Engineering program are currently offered on the College Park campus, at off-campus centers via video-teleconferencing, and 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, the University Center of Northeastern Maryland in Harford County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Transportation Systems, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Select four of the following:		12
ENCE670	Highway Traffic Characteristics and Measurements	
ENCE672	Regional Transportation Planning	
ENCE673	Urban Transportation	
ENCE677	OR Models for Transportation Systems Analysis	
ENCE688	Advanced Topics in Civil Engineering (ENCE688I - Discrete Choice Analysis)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688T - Transportation Network Algorithms and Implementations)	
Total Credits		12

Urban Agriculture (Z091)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Contact

Tammatha O'Brien
Academic Program Director
Department of Entomology
3118 Plant Science
4291 Fieldhouse Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1305
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Marcia Shofner
Academic Program Director
Department of Entomology
3148 Plant Science
4291 Fieldhouse Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3938
Email: mshofner@umd.edu

Website: http://oes-entm.umd.edu/

Relationships: Applied Entomology (MPAE) (p. 46) **Beekeeping (Z088)** (p. 67) **Integrated Pest Management (Z089)** (p. 259) **Organic and Sustainable Agriculture (Z090)** (p. 322) **Urban Agriculture (Z091)** (p. 421)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (http://gradschool.umd.edu/education/Z069))

Program-Specific Requirements

- Letters of Recommendation (1)
- Strong background in biology

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	26 July	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	26 July	N/A

Other Deadlines: Please visit the program website at http://oes-entm.umd.edu/

Requirements

- Urban Agriculture, Post-Baccalaureate Certificate (P.B.C.) (p. 422)

Urban Agriculture, Post-Baccalaureate Certificate (P.B.C.)

In this 12-credit certificate, students learn the skills required to maintain plants and beneficial insects within and around cities and about the urban ecosystem, policies, and plan

Course	Title	Credits
Required courses:		
ENTM710	Insect Biodiversity, Physiology and Ecology	3
ENTM740	Organic Practices	3
or ENTM730	Plant Diagnostics	
Two additional courses chosen with advisor		6
Total Credits		12

Urban Design (Z012)

Graduate Certificate Program
College: Architecture

This certificate is not currently accepting applications. Please visit our graduate program list (p. 18) for information on other programs.

Contact

Brian Kelly
Director of Architecture Program
1228 Architecture Building
3835 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4592
Email: bkelly@umd.edu

Website: http://www.arch.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	not currently accepting applications	not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	not currently accepting applications	not currently accepting applications

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Urban Design, Post-Baccalaureate Certificate (P.B.C.) (p. 422)

Urban Design, Post-Baccalaureate Certificate (P.B.C.)

15 credits required

Course	Title	Credits
Required courses:		
ARCH700	Urban Design Studio VII	6
or ARCH407	Graduate Architecture Design IV	
ARCH654	Urban Development and Design Theory	3
Select two of the following:		6
ARCH655	Urban Design Seminar	
ARCH778	Graduate Selected Topics in Urban Design	
ARCH779	Advanced Independent Studies in Urban Design	
Total Credits		15

Urban and Regional Planning and Design (URPD)

Graduate Degree Program
College: Architecture

Abstract

The School of Architecture, Planning and Preservation offers a Doctoral Program, the Ph.D. in Urban and Regional Planning and Design. Participating programs include Urban Studies and Planning, Architecture, Historic Preservation, Landscape Architecture, and The National Center for Smart Growth Research and Education. The program prepares students to teach at the university level in departments of Urban Planning, Architecture, Historic Preservation, Real Estate Development, or Landscape Architecture, as well as qualifies graduates to conduct research and participate in high-level decision-making in the public, private, and nonprofit sectors.

Financial Assistance

The School of Architecture, Planning, and Preservation, and The National Center for Smart Growth Research and Education together anticipate three research assistantships available to Doctoral students. Compensation for assistantships includes tuition remission for up to 10 credit hours per semester, plus a stipend. For more information contact the Doctoral Program.

Contact

Casey Dawkins, Ph.D.
Director of Graduate Studies
School of Architecture, Planning, and Preservation
1112H Preinkert Hall
7480 Preinkert Drive
College Park, MD 20742
Telephone: 301.405.6791
Fax: 301.314.9583
Email: dawkins1@umd.edu

Website: http://www.arch.umd.edu

Courses: ARCH HISP RDEV URSP

Relationships: Historic Preservation (HISP) (p. 238)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Master's degree in a related field

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Urban and Regional Planning and Design, Doctor of Philosophy (Ph.D.) (p. 423)

Urban and Regional Planning and Design, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 39 credits, including 12 credits of URSP899.

The Ph.D. in Urban and Regional Planning and Design is a 39-credit program. The program is highly selective and individualized. Approximately five students will be admitted each year. Adequately prepared students will generally need four semesters of formal course work leading to comprehensive exams and all students are required to spend a minimum of two years in residence. The program is designed as a full-time program to be completed in four years.

Students admitted to the doctoral program will be expected to have completed a master's degree in a related field including, but not exclusively, urban planning, architecture, historic preservation, real estate development, or landscape architecture. Students are expected to enter the Ph.D. program with two semesters of graduate level quantitative research methods. These courses can be taken after entrance to the program and prior to their advanced methods course.

Course	Title	Credits
Required courses:		
URSP804	Advanced Planning Theory	3
URSP810	Contemporary Metropolitan Issues	3
URSP805	Seminar in Research Design	3
Advanced Analytical Methods course		3
Select three major field courses		9
Select two minor field courses		6
Dissertation Research Requirements		
URSP899	Doctoral Dissertation Research	12
Total Credits		39

Veterinary Medical Sciences (VMSC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The **Department of Veterinary Medicine** under the **College of Agriculture and Natural Resources (AGNR)** at the **University of Maryland** is home to the Veterinary Medical Sciences (VMSC) Graduate Program, which is a collaborative program between the University of Maryland, College Park and Virginia Tech under The **Virginia-Maryland Regional College of Veterinary Medicine**.

The program offers both **Master of Science (M.S.)** and **Doctor of Philosophy (Ph.D.)** degrees. Members of the VMSC Graduate Program faculty specialize in a wide range of research interests in infectious diseases and zoonoses, including cell and molecular biology, microbiology, immunology, virology, and poultry health management and disease prevention.

Financial Assistance

A number of graduate assistantships are available and awarded to candidates with strong academic records.
Teaching Assistantships, Research Assistantships, Scholarships, and Fellowships are available on a competitive basis. Research Assistantships (RAs) are 12-month appointments and Teaching Assistantships (TAs) are 10-month appointments. Benefits for each assistantship include stipends, ten credits of tuition remission per semester, and health benefits. Generally, student assistantships are offered for two years for an M.S. degree and four years for a Ph.D. degree.

Sources of funding include the VMRCVM; Maryland Agricultural Experiment Station; Maryland Cooperative Extension; College of Agriculture and Natural Resources; Graduate School open-nomination and block grant fellowships (for recruitment of new students only); University diversity fellowships; endowed fellowships; and funds from faculty research contracts and grants. Inquiry about the stipends can be made to the VMSC Graduate Program.

Contact

Utpal Pal, Ph.D.
Professor & Director
VMSC Graduate Program
Department of Veterinary Medicine
Avrum Gudelsky Veterinary Center
8075 Greenmead Drive
College Park, MD 20742

Telephone: 301.314.2118
Fax: 301.314.6855
Email: upal@umd.edu

Website: http://vetmed.umd.edu

Courses: ANSC BCHM BIOM MICB MOCB VMSC

Relationships: Biological Sciences (BISI) (p. 81)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

Applicants with a minimum degree of **Bachelor of Science (B.S.)** in a biological science or related field of study are eligible for admission to the VMSC Graduate Program, either for Ph.D. or M.S. degree.

A minimum Grade Point Average (GPA) of 3.0 on a 4.0 scale (B or better) and a minimum Graduate Record Examination (GRE) combined score of 1100 (verbal and quantitative) are required.

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	1 Nov	14 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Mar	28 Sep

Other Deadlines: Please visit the program website at http://vetmed.umd.edu

Requirements

- Veterinary Medical Sciences, Doctor of Philosophy (Ph.D.) (p. 425)
- Veterinary Medical Sciences, Master of Science (M.S.) (p. 424)

Facilities and Special Resources

The Avrum Gudelsky Veterinary Center, the University of Maryland home of the VMRCVM, lies in the heart of Maryland's thriving biotechnology community, and is near Maryland's major university research campuses and government laboratories, including the USDA Beltsville Agriculture Research Center, the National Institutes of Health, and Walter Reed Armed Forces Institute of Pathology. The Center contains 32,000 square feet of research and support laboratories, including animal care facilities. The 10,000 square-foot research laboratories are fully equipped with state-of-the-art facilities for molecular biology research, cell culture facilities, a confocal microscope, a fluorescence activated cell sorter, and a sophisticated electron microscope suite. Approximately 18,000 square feet of space comprise Biological Safety Levels 2 and 3 facilities and facilities for laboratory animals and poultry. The poultry unit has 15 rooms for housing poultry, each equipped with 20 poultry isolators to contain any infectious pathogens and maintain a disease-free environment. The animal facility has a fully equipped necropsy room designed for postmortem analysis.

The Avrum Gudelsky Veterinary Center also houses the drug-testing laboratory of the Maryland Horse Racing Commission, and the Poultry Research and Development Unit of Synbiotics Corporation. This co-location facilitates active collaboration in both applied and basic research on diseases of animals.

The Laboratory for Biological Ultrastructure in the Department of Biology is equipped with a transmission and scanning electron microscope, a confocal light microscope, ultramicrotomes, and equipment for freeze-fracture studies. The Department of Cell Biology and Molecular Genetics has a Fluorescence-Activated Cell Sorter for supporting cell biology research. The campus has Central Animal Resource Facilities (CARF) for maintaining laboratory animals to facilitate animal research. Extensive library facilities are available on campus. In addition, the College Park campus is close to the National Agricultural Library (NAL) and the National Library of Medicine (NLM). The Library of Congress and the National Archives, along with several other libraries of biomedical research and academic institutes, are located within a short driving distance.

Computer facilities at the University of Maryland are outstanding. Veterinary Medicine provides computer access to all faculty and graduate students. Students are provided with e-mail accounts and free Internet access. The campus maintains both Unix and mainframe systems, and access to supercomputers for specific research projects. Software for graphics, modeling, statistics, and the analysis of molecular data is readily available.

The College Park campus is also ideally situated near a number of federal agencies involved in veterinary medical sciences. Collaborative initiatives are underway with the U.S. Food and Drug Administration's Centers for Veterinary Medicine (CVM) and Food Safety and Applied Nutrition (CFSAN); U.S. Department of Agriculture's Animal and Plant Health Inspection Services (APHIS), Food Safety and Inspection Service (FSIS), Agricultural Research Service (ARS), and Beltsville Agriculture Research Service (BARC); National Institutes of Health (NIH); Walter Reed Armed Forces Institute of Pathology (AFIP); World Bank; and Pan American Health Organization (PAHO). Scientists from some of these agencies have adjunct appointments with the College of Veterinary Medicine and participate on students' graduate committees.

Veterinary Medical Sciences, Master of Science (M.S.)

Thesis only: 30 credits

Students with adequate undergraduate training usually complete the master's degree within two years.

Course	Title	Credits
VMSC698	Seminar in Veterinary Medical Science	1
VMSC799	Thesis Research	6

Select one graduate level biometrics or biochemistry course	3
Select at least 12 credits of VMSC courses	12
Select eight additional credits	8
Total Credits	30

During the first semester the student selects an advisor, and with the help of the advisor forms an Advisory Committee with the approval by the program's Graduate Education Committee. By the end of the second semester with the advice of the Advisory Committee, the student files a proposed schedule of course work including at least one credit of seminar (VMSC698). A minimum of 24 semester with hours of graduate courses and six hours of thesis research credit (VMSC799) is required for the degree. No less than 12 credits should be from courses 600 level or higher; at least 12 credits must be earned in the major subject. Three credits of graduate biometrics or biochemistry and one seminar credit (VMSC698) are required. No more than two credits of Special Problems (VMSC699) are acceptable as part of the 24 required course credits.

Students must maintain an overall GPA of 3.0 or better in courses taken for graduate credit. The committee may require remedial courses if the student enters with inadequate prerequisites or deficiencies in the undergraduate program. By the end of the second semester, a thesis research proposal must be approved and filed. The student must present the thesis in a public seminar and pass a final oral examination given by the Advisory Committee.

Details on the Graduate School policy on the Master's Thesis Examination may be found in the Graduate School Catalog at http://www.gradschool.umd.edu/catalog/masters_degree_policies.htm. The thesis must be submitted to the Graduate School in electronic format after final approval of the document by the Thesis Examining Committee. See the University of Maryland Thesis and Dissertation Style Guide (http://www.gradschool.umd.edu/etd) for the details of this process.

Veterinary Medical Sciences, Doctor of Philosophy (Ph.D.)

Applicants with a D.V.M., M.D., or equivalent or related degree in biological sciences plus a M.S. degree may be admitted to the Ph.D. program. In exceptional cases, admission to the Ph.D. program without a M.S. degree may be considered but these candidates must complete a minimum of 24 hours of course work. Ph.D. candidates who have previously completed the D.V.M. and/or M.S. degree must meet the minimum course requirements of 12 credits, and a minimum of twelve dissertation research credits (VMSC899). No more than two credits of Special Problems (VMSC699) are acceptable as part of the 12 required course credits. Two additional seminar credits (VMSC698) are required.

Students are required to register for one seminar credit (VMSC698) each academic year. Two seminar credits will be counted toward degree requirements. All students are expected to attend seminars regularly. Students are required to take a written and oral comprehensive examination and submit and defend their Ph.D. dissertation in partial fulfillment of the doctoral degree (see below).

DOCTORAL REQUIREMENTS

During the first semester, the student selects an advisor and with the help of the advisor forms an Advisory Committee. The Advisory Committee and the student must meet by the end of the second semester to approve the student's plan of study. By the end of the second semester the student will submit to the Advisory Committee a dissertation research proposal. An oral and written comprehensive examination is required for advancement to candidacy. Prior to the final dissertation, an oral examination is required for advancement to candidacy. A student must be admitted to candidacy for the doctorate within five years after admission to the doctoral program and at least six months before the date on which the degree will be conferred. It is the responsibility of the student to submit an application for admission to candidacy when all the requirements for candidacy have been fulfilled. Applications for admission to candidacy are made in duplicate by the student and submitted to the graduate program for further action and transmission to the Graduate School . Application forms may be obtained at the Graduate School, Room 2123, Lee Building, or on the web. Paperwork must be received by the Graduate School prior to the 25th of the month in order for the advancement to become effective the first day of the following month. Doctoral candidates are automatically registered for six (6) credits of Doctoral Dissertation Research (899), for which they pay the flat candidacy tuition. Prior to the final dissertation oral examination, the candidate must present a public seminar. Details on the Graduate School policy on the Doctoral Dissertation and Examination may be found in the Graduate School Catalog at: http://www.gradschool.umd.edu/catalog/doctoral_degree_policies.htm

Dissertations are to be submitted to the Graduate School in electronic format after final approval of the dissertation by the Dissertation Examining Committee. See the University of Maryland Electronic Thesis and Dissertation (ETD) website at http://dissertations.umi.com/umd or the University of Maryland Thesis and Dissertation Style Guide (http://www.gradschool.umd.edu/styleguide) for the details of this process.

Curriculum requirements

Course	Title	Credits
Core Requirements		
VMSC698	Seminar in Veterinary Medical Science	2
Select 10 credits of coursework		10
Dissertation Research Requirements		
VMSC899	Dissertation Research	12
Total Credits		24

Veterinary Medicine (VMED)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Virginia-Maryland Regional College of Veterinary Medicine offers a four-year full-time program (curriculum) leading to the Doctor of Veterinary Medicine (D.V.M.) degree. The first three years are taught at Virginia Tech University in Blacksburg, VA in a case-based and traditional lecture/laboratory format. At the end of the first year, students choose a track - small animal, food animal, equine, mixed species and public/corporate veterinary medicine. Considerable flexibility exists for a student to tailor their curriculum to meet individual needs and interests. The senior year (clinical) is 12 months in length. For detailed information on the Doctor of Veterinary Medicine (DVM) program, please visit the Virginia-Maryland Regional College of Veterinary Medicine at: http://www.vetmed.vt.edu/

Contact

Shelby Jenkins

D.V.M. Program Admissions Coordinator
Virginia-Maryland Regional College of Veterinary Medicine
DVM Admissions Office (0442)
245 Duck Pond Drive
Blacksburg, VA 24061
Telephone: 540.231.4699
Fax: 540.231.9290
Email: dvmadmit@vt.edu

Website: http://www.vetmed.vt.edu

Admissions

For information on applying to the Doctor of Veterinary Medicine (DVM) program, please visit the Virginia-Maryland Regional College of Veterinary Medicine website at: http://www.vetmed.vt.edu

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	see program website	see program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	see program website	see program website

Other Deadlines: Please visit the program website at http://www.vetmed.vt.edu

Requirements

- Veterinary Medicine, Doctor of Veterinary Medicine (D.V.M.) (p. 426)

Veterinary Medicine, Doctor of Veterinary Medicine (D.V.M.)

Please visit the program website.

Wireless Communications (Z120)

Graduate Certificate Program
College: Engineering

ABSTRACT

The aim of the Graduate Certificate in Wireless Communications is to encourage the students to acquire specialized knowledge and skills in the technical area of wireless communications. We have positioned this Certificate to allow the students to further deepen their understanding of wireless communication technologies, and become specialists in this sub-field of telecommunications. While going through the certificate program, students will also acquire/develop additional practical problem-solving and analytical skills and become proficient in using one or more industry-standard RF and wireless network design and testing tools. Typical industry positons our students take after graduation that would benefit from this Certificate include: RF engineer, wireless test engineer, RF analyst, and specialist RAN engineer. (RF stands for radio frequency, and RAN stands for Radio Access Network.)

CONTACT

Master's in Telecommunications Program Office
2433 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu

Admissions

The Certificate in Computing Systems is only available to current Telecommunication students.

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	N/A	N/A

Requirements

- Wireless Communications, Post-Baccalaureate Certificate (P.B.C.) (p. 426)

Wireless Communications, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Complete four of the following courses, with at least two at the 700-level		12
ENTS657	Satellite Communication Systems	
ENTS689	Special Topics in Telecommunications (ENTS689F - Fundamentals of Wireless LANs)	
ENTS689	Special Topics in Telecommunications (ENTS689L - Cellular Network Infrastructure- Cell Site Design and Components)	
ENTS689	Special Topics in Telecommunications (ENTS689W - Short-range Wireless Systems)	
ENTS659	Special Topics in Communications	
ENTS759	Advanced Topics in Communications	
Total Credits		12

Women's Studies (WMST)

Graduate Degree Program
College: Arts and Humanities

Abstract

Women's Studies offers an interdisciplinary and integrative program of study leading to the Master of Arts and Doctor of Philosophy degrees. Students will be expected to develop a thorough grounding in the new scholarship on women; acquire an understanding of gender as a category of analysis; analyze and assess theories about the role of gender in systems of hierarchy and its intersection with other categories of difference, such as race, ethnicity, religion, class, sexuality, disability, and age; develop competence in women's studies theories, research methods, and pedagogy, including issues related to women's diversity nationally and globally; and achieve competence in a selected area of specialization.

Financial Assistance

The Women's Studies Department awards a small number of recruitment fellowships to selected candidates. Women's Studies also awards teaching assistantships, research assistantships, and administrative assistantships, are the primary forms of financial aid. These assistantships carry a stipend, benefits, and remission of tuition up to ten credit hours each semester.

Contact

Program Administrative Specialist
Women's Studies
2101 Woods Hall
4302 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6877
Fax: 301.314.9190
Email: womensstudies@umd.edu

Website: http://wmst.umd.edu

Courses: WMST

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/069))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations
- Writing Sample: 10 pages maximum

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	30 Nov
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	30 Nov

Other Deadlines: Please visit the program website at http://wmst.umd.edu

Requirements

- Women's Studies, Doctor of Philosophy (Ph.D.) (p. 428)
- Women's Studies, Master of Arts (M.A.) (p. 427)

Facilities and Special Resources

Resources for research in the College Park and Washington D.C. are unsurpassed. The University's libraries hold around 2,500,000 volumes. In addition to the outstanding holdings of the Library of Congress, the area also offers the specialized resources of the National Archives and Archives II (located on the grounds of the University of Maryland); the Smithsonian Institution; the National Museum of Women in the Arts; and a broad array of public policy organizations and "think-tanks," such as the Institute for Women's Policy Research, Women's Legal Defense Fund, National Organization for Women, American Association of University Women, Women's Research and Education Institute, National Women's Law Center, American Council on Education's Office of Women in Higher Education, Business and Professional Women's Foundation, Center for Policy Alternative's Women's Policy and Programs, Center for Women's Policy Studies, Feminist Majority, General Federation of Women's Clubs International's Women's History and Resources Center, International Center for Research on Women, National Association for Women in Education, Program on the Studies and Education on Women of the Association of American Colleges and Universities, and the Union Institute Center for Women, plus the many research and policy institutes with include gender issues as part of their agenda.

The National Women's Studies Association, the professional association of the discipline is located in Baltimore, and one of the leading scholarly journals in our field, Feminist Studies, is located on our campus. Some graduate students may be able to broaden their experience and enhance the applicability and marketability of their coursework by undertaking internships in these two organizations.

The University of Maryland Consortium on Race, Gender and Ethnicity offers grant-getting potential and otherwise support the research endeavors of faculty in these fields. Grants funded through the Consortium will provide additional funding for Women's Studies graduate students and invaluable research experience. High enrollment demand in Women's Studies introductory CORE courses provide yet another opportunity for funding graduate student's programs of study with teaching assistantships.

Women's Studies, Master of Arts (M.A.)

Thesis option: 31 credits

Non-thesis option: 31 credits

Women's Studies does not have a stand-alone M.A. program. However, on the way to a Ph.D., students who have completed the appropriate coursework may request conferral of a master's degree. Students will begin the graduate program with a sequence of courses that include the required core interdisciplinary courses for a total of 31 credits and finish with either the completion of a thesis or the 'general' examination. This portion of the program stresses interdisciplinary Master's courses offered in the Department of Women's Studies.

Course	Title	Credits
Required courses:		
WMST601	Approaches to Women's Studies I	3
WMST602	Approaches to Women's Studies II	3
WMST618	Feminist Pedagogy	3
WMST621	Feminist Theories and Women's Movements: Genealogies	3
WMST628	Women's Studies Colloquium	3
Select 16 additional credits		16
Thesis or Non-Thesis Requirements		
Select one of the following:		
Thesis Option:		
Students must pass the General Exam and pass the 2-year paper with an oral defense		
Non-Thesis Option:		
Students must pass the General Exam		
Total Credits		31

Women's Studies, Doctor of Philosophy (Ph.D.)

Students entering with a bachelor's degree are required to complete 27 credits of required courses and 27 credits of electives for a total of 54 credits. Students entering with a master's degree in Women's Studies or a graduate certificate in Women's Studies are required to complete 27 credits of required courses and 7 credits of electives. Non-course requirements for all students include passing the General Examination, Second Year Paper, Portfolio Review, Major Field Exam, Prospectus, Dissertation Defense. Students must also demonstrate reading competency in a language other than English, relevant to their course of study.

Students' continued participation in the doctoral program is dependent upon the quality of their coursework, research and writing, the completion of an interdisciplinary paper and successfully passing exams. After successfully completing the M.A. portion of the program, students will meet with a committee of advisors to determine the balance of their program of coursework. A full complement of courses is oriented toward two enterprises:

1. developing a major field and passing a major field exam, i.e. an interdisciplinary topical inquiry, that will support the dissertation; and
2. developing the research skills of two methodologies.

In addition, students must and demonstrate reading competency in a language other than English, relevant to their course of study. Students entering with a bachelor's degree are required to complete a minimum of 54 credits, including 12 dissertation research credits. Students entering with a graduate certificate in Women's Studies or a master's degree are required to take a minimum of 34 credits, including 12 dissertation research credits.

Course	Title	Credits
Required courses:		
WMST601	Approaches to Women's Studies I	3
WMST602	Approaches to Women's Studies II	3
WMST618	Feminist Pedagogy	3
WMST621	Feminist Theories and Women's Movements: Genealogies	3
WMST628	Women's Studies Colloquium	3
Electives		27
Dissertation Research Requirements		
WMST899	Doctoral Dissertation Research	12
Total Credits		54

Women's Studies (Z006)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The Graduate Certificate in Women's Studies is offered to students enrolled in other graduate degree programs at the University of Maryland.

CONTACT

Program Administrative Specialist
Women's Studies
2101 Woods Hall
4302 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6877
Fax: 301.314.9190
Email: womensstudies@umd.edu

Website: http://wmst.umd.edu

Admissions

Please visit the department website for more information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://wmst.umd.edu

Requirements

- Women's Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 429)

Women's Studies, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Please visit the program website (http://wmst.umd.edu) for more information.

Course	Title	Credits
WMST601	Approaches to Women's Studies I	3
WMST602	Approaches to Women's Studies II	3
WMST621	Feminist Theories and Women's Movements: Genealogies	3
Select nine credits of electives chosen with advisor		9
Total Credits		18

World Languages Education (Z095)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.education.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069))

Program-Specific Requirements:

- Letters of Recommendation (3)

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not Accepting Applicants for Fall 2018
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not Accepting Applicants for Fall 2018

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- World Languages Education, Post-Baccalaureate Certificate (P.B.C.) (p. 429)

World Languages Education, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
EDCI688	(EDCI688A)	3
EDCI625		3
EDCI631		3
EDCI732		3
Total Credits		12

Youth Experience (Z113)

Graduate Certificate Program
College: Information Studies

Abstract

The Post-Baccalaureate Certificate of Professional Studies in Youth Experience will build the capacity to better adapt to the changing landscape of youth learning and technology. The Post-Baccalaureate Certificate of Professional Studies in Youth Experience prepares librarians to promote 21st century skills among youth ages 0-18 through incorporating participatory design principles, design thinking approaches, and dynamic community partnerships in their offerings of programs and services. At the completion of the online certificate, librarians will be able to:

- Facilitate learning with technology in any physical, virtual or hybrid learning environment using tested skills and practices for different types of youth.
- Methods for engaging youth as co-designers using the design thinking process.
- Demonstrate an understanding of the issues, concepts, and policies related to youth-led learning and programming through libraries.
- Implement best practices to be inclusive of all youth's needs, in particular youth from disadvantaged populations;
- Apply core theories and models from information science and learning sciences to address needs of youth; and
- Partner with other cultural institutions and community organizations to help with youth programming, education, and other projects related to youth development.

CONTACT

Graduate Student Services Office
College of Information Studies
4120 Hornbake Building, South Wing
4130 Campus Drive
College Park, MD 20742
Telephone: 301.405.2038
Fax: 301.314.9145
Email: ischooladvisors@umd.edu

Website: http://ischool.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

- Letters of Recommendation (1): Letter of recommendation needs to come from a supervisor or someone who can speak to the applicant's capacity for successfully completing the certificate program.
- CV/Resume
- Master's degree in library/information science.
- Current librarian: Must be currently a school or public librarian working with children and teens; or A recent MLIS graduate or librarian who would like additional experience working with children and teens.

All applicants must have:

- Received a four-year baccalaureate degree;
- Received a master's degree in library or information science;
- Earned a minimum GPA of 3.0 (on a 4.0 scale) in all prior undergraduate and graduate course work;
- Must be currently a school or public librarian working with children and teens; or
- A recent MLIS graduate or librarian who would like additional experience working with children and teens
- GRE Scores are NOT required.

Summer Admissions Only

February 16 application deadline (domestic/international students) Please view the YX website (http://yx.umd.edu/apply) OR email yxischool@umd.edu for admissions information.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.New Row	Please visit the department website

Other Deadlines: Please visit the program website at http://ischool.umd.edu

Requirements

- Youth Experience, Post-Baccalaureate Certificate (P.B.C.) (p. 430)

Youth Experience, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
INST650	Facilitating Youth Learning in Formal and Informal Environments	3
INST651	Promoting Rich Learning with Technology	3
INST652	Design Thinking and Youth	3
INST794	Capstone in Youth Experience	3
Total Credits		12

FACULTY LISTING

Last Name	First/Middle Name	Graduate Faculty Status	Academic Credentials	Positions
A'Hearn	Michael F.	Full Member	B.S., Boston College, 1961; Ph.D., University of Wisconsin-Madison, 1966.	n/a
Abadi	Daniel J.	Full Member	B.S., Brandeis University, 2002; M.Ph., University of Cambridge, 2003; Ph.D., Massachusetts Institute of Technology, 2008	Professor, Computer Science
Abed	Eyad	Full Member	B.S., Massachusetts Institute of Technology, 1979; M.S., University of California-Berkeley, 1981; Ph.D., 1982. GCEN Academic Advisor for Systems Engineering	Professor, Electrical and Computer Engineering Professor, Systems Engineering
Abraham	Katharine	Full Member	B.S., Iowa State, 1976; Ph.D., Harvard University, 1982.	Professor, Intermediate Survey Methodology Professor, Survey and Data Science (online) Professor, Survey Methodology Professor, Survey Statistics
Abshire	Pamela	Full Member	B.S., California Institute of Technology, 1992; M.S., The Johns Hopkins University, 1997; Ph.D., The Johns Hopkins University, 2001.	Professor, Electrical and Computer Engineering Associate Professor, Neurosciences and Cognitive Science Associate Professor, Systems Engineering
Ad-Marbach	Gili	Adjunct Member	Ph.D., Tel-Aviv University, Israel, 1997M.Sc., Tel-Aviv University, Israel, 1988B.Sc., Tel-Aviv University, Israel, 1986	n/a
Adams	Jeffrey D.	Full Member	B.A., Johns Hopkins University, 1977; Ph.D., Yale University, 1981.	Associate Chair, Mathematics Professor, Mathematics
Adams	William W.	Full Member	B.A.,University of California-Los Angeles, 1959; Ph.D., Columbia University, 1964.	
Adams	Lowell W.	Full Member	B.S., Virginia Polytechnic Institute & State University, 1968; M.S., Ohio State University-Columbus, 1973; Ph.D., 1976.	n/a
Adams	Lowell W.	Special Member	B.S., Virginia Polytechnic Institute & State University, 1968; M.S., Ohio State University, 1973; Ph.D., Ohio State University, 1976	University Affiliate, Environmental Science and Technology
Ades	Ibrahim Z.	Full Member	B.A.,University of California-Los Angeles, 1971; Ph.D., 1976.	Associate Professor, Biological Sciences

Adler	Eric	Full Member	B.A., Connecticut College, 1995; M.A.,SUNY Buffalo,1998; Ph.D., Duke University, 2005.	Associate Professor, Classics
Adomaitis	Raymond A.	Full Member	B.S., Illinois Institute of Technology, 1984;Ph.D., 1988.	Professor, Systems Engineering Professor, Chemical Engineering
Adsanatham	Chanon	Full Member	B.A. Univ. of Colorado, 2003; M.A. 2008; Ph.D. Miami University, 2014.	Assistant Professor, English Language and Literature
Afflerbach	Peter P.	Full Member	B.A., State University of New York-Albany, 1978; M.S., 1979; Ph.D., 1985.	Professor, Teaching and Learning, Policy and Leadership Professor, Curriculum and Instruction
Afzal	Madiha	Full Member		n/a
Agar	Michael	Full Member	Ph.D., University of California Berkeley, 1971; BA - Anthropology, Stanford University, 1967	n/a
Agarwal	Ritu	Full Member	B.A., University of Delhi, 1982; M.B.A., Indian Institute of Management, Calcutta,1984; M.S., Syracuse University, 1988; Ph.D., Syracuse University, 1988.	n/a
Agashe	Kaustubh	Full Member	B.Tech., Indian Institute of Technology, 1993; Ph.D., University of California, Berkeley, 1998.	Associate Professor, Physics
Aggour	Mohamed S.	Full Member	B.S., Cairo University, 1964;M.S., 1966; Ph.D., University of Washington, 1972.	Professor, Civil and Environmental Engineering
Agrawala	Ashok K.	Full Member	B.S., Agra University, 1960; B.E., Indian Institute of Science-Bangalore, 1963; M.Eng., 1965; Ph.D.,Harvard University, 1970.	Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Computer Science Affiliate Professor, Electrical and Computer Engineering
Aguilar-Mora	Jorge	Special Member	B.A., Universidad Nacional de Mexico, 1966; Ph.D., El Colegio de Mexico, 1976.	Distinguished University Professor Emeritus, Spanish Language and Literature
Ahmed	Hafiz	Full Member	B.S., The University of Calcutta, 1980; M.S., The University of Calcutta, 1983; Ph.D., Jadavpur University, 1986.	Assistant Professor, Marine, Estuarine, and Environmental Sciences
Ahn	June	Full Member	B.A., Brown University, 2003; M.A., Columbia University, 2006; Ph.D., University of Southern California, 2010.	n/a
Ahrens	Richard A.	Full Member	B.S.,University of Wisconsin-Madison, 1958; Ph.D., University of California-Davis,1963.	Professor Emeritus, Nutrition and Food Science

Akin	David L.	Full Member	S.B., Massachusetts Institute of Technology, 1974; S.M., 1975; Sc.D., 1981.	Associate Professor, Applied Mathematics & Statistics, and Scientific Computation Associate Professor, Aerospace Engineering
Al-Sheikhly	Mohamad I.	Full Member	B.Sc., University of Baghdad, 1974; Ph.D., University of Newcastle, 1981.	Professor, Materials Science and Engineering Affiliate Professor, Chemical Engineering
Alberini	Anna	Full Member	B.A., Italy, 1987; M.A., 1989; Ph.D., University of California-San Diego, 1992.	Professor, Agricultural and Resource Economics
Albrecht	Pedro	Full Member	Ph.D., Lehigh University, 1972.	Professor Emeritus, Civil and Environmental Engineering
Alcaniz	Isabella	Full Member	Licenciada in IR, Universidad de Belgrano, 1994; MA, Northwestern University, 1999; Ph.D. Northwestern University, 2004	Assistant Professor, Government and Politics
Aldoory	Linda	Full Member	B.A., George Washington University, 1988; M.A., University of Texas-Austin, 1991; Ph.D., Syracuse University, 1998.	Professor, Communication
Alexander	Millard H.	Full Member	B.A., Harvard University, 1964; Ph.D.,University of Paris, 1967.	Distinguished University Professor, Applied Mathematics & Statistics, and Scientific Computation Distinguished University Professor, Chemical Physics Distinguished University Professor, Chemistry
Alexander	James C.	Full Member	B.A., Johns Hopkins University, 1964; Ph.D., Johns Hopkins University, 1968.	Professor Emeritus, Mathematics
Alexander	Patricia A.	Full Member	B.A., Bethel College-McKenzie, 1970; M.Ed., James Madison University, 1979; Ph.D., University of Maryland-College Park, 1981.	Professor, Human Development
Alford	Charles F.	Full Member	B.A., Austin College, 1969; M.A., University of Texas-Austin, 1971; Ph.D., 1979.	Professor, Government and Politics
Allee	Todd	Full Member	B.A., University of Missouri, 1994; M.S., London School of Economics and Political Science, 1996; Ph.D., University of Michigan, 2003.	Assistant Professor, Government and Politics
Allen	Dale	Adjunct Member	B. S., Iowa State University, 1984; M. S., Florida State University, 1987; Ph. D., University of Maryland, 1996.	Associate Research Scientist, Atmospheric and Oceanic Science
Allewell	Norma M.	Full Member	B.Sc., Biochemistry, McMaster Univ., Hamilton, Ontario, 1965 Ph.D., Molecular Biophysics, Yale University, 1969	Professor, Biological Sciences

Alley	Carroll O., Jr.	Full Member	B.S., University of Richmond, 1948; M.A.,Princeton University, 1951; Ph.D., 1962.	n/a
Almon	Clopper	Full Member	B.A., Vanderbilt University, 1956; Ph.D.,Harvard University, 1962.	Professor Emeritus, Economics
Almquist	David L.	Full Member	B.Arch., University of Virginia, 1968; M.S.,University of Maryland-College Park, 1973.	n/a
Aloimonos	John	Full Member	B.S., University of Athens-Greece,1981; M.S., University of Rochester, 1984; Ph.D., 1987.	Professor, Neurosciences and Cognitive Science Professor, Computer Science Affiliate Professor, Electrical and Computer Engineering
Alt	Francis B.	Full Member	B.S.E., Johns Hopkins University, 1967; M.S., Georgia Institute of Technology, 1973; Ph.D., 1977.	Associate Professor, Applied Mathematics & Statistics, and Scientific Computation
Alvares de Azevedo Lau	Ellen	Full Member	B.S., Michigan State University, 2003; Ph.D., University of Maryland-College Park, 2009.	
Alvestad	Kathryn	Adjunct Member	B.S., Virginia Polytechnic & State University, 1970; M.Ed., University of Maryland-College Park, 1976; Ph.D., University of Maryland-College Park, 1991.	n/a
Alvi	Diba	Adjunct Member	B.M. Voice Performance, Minor in Musicology, M.M. Opera Theater, Oberlin Conservatory; Specailist Degree, Voice Performance, U. of Michigan; D.M.A. Voice Performance, U. of Maryland	n/a
Ambacher	Bruce I.	Adjunct Member	B.A., Pennsylvania State University, 1965; M.A., Pennsylvania State University, 1967; Ph.D., Temple, 1970.	n/a
Ambrose	Michael A.	Full Member	BArch., Temple University, 1996 MArch., Syracuse University, 2001	Assistant Director, Architecture Assistant Director Assistant Director, NULL
Amde	Amde M.	Full Member	B.E.S.,Johns Hopkins University, 1970; M.S., University of California-Berkeley, 1971; Ph.D., State University of New York-Buffalo, 1976.	Professor, Civil and Environmental Engineering
Anand	Davinder K.	Full Member	B.S., George Washington University, 1959; M.S., 1961; Ph.D., 1965. GCEN Academic Advisor for Energetic Concepts Development	Professor Emeritus, Mechanical Engineering

Anandalingam	Gnanalingam	Full Member	B.A., University of Cambridge, 1975; M.S., Harvard University, 1977; Ph.D., Harvard Univerity, 1991.	n/a
Anastos	George	Full Member	B.S., University of Akron, 1942; M.A.,Harvard University, 1947; Ph.D., 1949.	n/a
Anderson	John D.	Full Member	B.S. University of Florida, 1959; Ph.D., Ohio State University-Columbus, 1966.	Professor Emeritus, Aerospace Engineering
Anderson	James Robert	Full Member	B.S., Iowa State University, 1955; Ph.D., 1967.	Professor Emeritus, Physics Research Professor, Physics
Anderson	Elaine A.	Full Member	B.S., University of Nebraska-Lincoln, 1973; M.S., Pennsylvania State University-University Park, 1975; Ph.D., 1979.	Chair, Family Science Chair, Maternal and Child Health
Anderson	Ann	Non-Member		Lecturer, Landscape Architecture
Anderson	Samira	Full Member	B.A., Indiana University, 1979;M.A., Indiana University, 1981;Au.D, University of Florida, 2000; Ph.D. Northwestern University, 2012	Assistant Professor, Hearing and Speech Sciences Assistant Professor, Neurosciences and Cognitive Science Assistant Professor, Clinical Audiology
Anderson	Lindsey	Full Member	B.A., Purdue University, 2004; M.A., Indiana University, 2010; Ph.D., Purdue University, 2014	Assistant Professor, Communication
Andrews	David L.	Full Member	B.Ed. Exeter University, 1985; M.S. University of Illinois at Urbana-Champaign, 1991; Ph.D., University of Illinois at Urbana-Champagne, 1993.	Professor, Kinesiology Professor, Physical Activity Affiliate Associate Professor, Sociology
Andrews	Norma	Full Member	Ph.D. University of Sao Paulo, Brazil 1983.	Professor, Biological Sciences
Angel	C. Roselina	Full Member	B.S., Iowa State University, 1984;M.S., 1987; Ph.D., 1990.	Professor, Animal Sciences
Anischenkova	Valerie	Full Member	B.A./M.A. St. Petersburg State University, 1997; M.A. University of Michigan, 2001; Ph.D. University of Michigan, 2007	Affiliate Associate Professor, Comparative Literature
Anisimov	Mikhail A.	Full Member	Ph.D., Moscow State University, 1968.	Professor, Chemical Engineering Professor, Chemical Physics
Ankem	Sreeramamurthy	Full Member	B.Eng.,K.R. Engineering College-University of Mysore, 1972; M.Eng., Indian Institute of Science-Bangalore, 1974; Ph.D.,Polytechnic Institute of New York, 1980.	Professor, Materials Science and Engineering
Anlage	Steven	Full Member	B.S., Rensselaer Polytechnic Institute, 1982; M.S.,California Institute of Technology, 1984; Ph.D., 1988.	Professor, Physics Affiliate Professor, Electrical and Computer Engineering

Anlage	Steven	Full Member	B.S., Rensselaer Polytechnic Institute, 1982; M.S., California Institute of Technology, 1984; Ph.D., California Institute of Technology, 1988	Professor, Materials Science and Engineering
Annand	Viki S.	Adjunct Member	B.S., Pennsylvania State University-University Park, 1969; M.Ed.,George Washington University, 1973; Ed.D., Temple University, 1990.	n/a
Antman	Stuart S.	Full Member	B.S., Rensselaer Polytechnic Institute, 1961; M.S.,University of Minnesota-Twin Cities, 1963; Ph.D., 1965.	Distinguished University Professor Emeritus, Applied Mathematics & Statistics, and Scientific Computation Distinguished University Professor Emeritus, Mathematics
Antonisse	Margaret	Non-Member	B.A., Lafayette College, PA, 1973; M.O., University of Michigan-Ann Arbor, 1976; PhD, University of Maryland-College Park, 2000	Senior Lecturer, Linguistics
Antonsen	Thomas M., Jr.	Full Member	B.S., Cornell University, 1973; M.S., 1976; Ph.D., 1977.	Professor, Electrical and Computer Engineering Professor, Physics
Aparicio	Elizabeth	Full Member		n/a
Aparicio	Elizabeth	Full Member	M.S.W., Catholic University of America, 2005; Ph.D., University of Maryland Baltimore, 2014	Assistant Professor, Behavioral and Community Health Assistant Professor, Behavioral and Community Health
Applebaum	Ian	Full Member	B.S., Rensselaer Polytechnic Institute, 1997, Ph.D., Massachusetts Institute of Technology, 2003	Associate Professor, Physics Affiliate Professor, Electrical and Computer Engineering
Aranda-Espinoza	Jose Helim	Full Member	B.S., University of Zacatecas, Mexico 1990; M.S., University of San Luis Potosi, Mexico 1993; Ph.D., University of San Luis Potosi, Mexico 1998.	Associate Chair, Bioengineering Associate Professor, Bioengineering Associate Professor, Biophysics Affiliate Associate Professor, Materials Science and Engineering
Araneda	Ricardo	Full Member	B.S., University of Concepcion, 1986; M.S., Albert Einstein College of Medicine, 1992; Ph.D., Albert Einstein College of Medicine, 1997.	Associate Professor, Biological Sciences Assistant Professor, Neurosciences and Cognitive Science
Arbaugh	William	Full Member	Ph.D., University of Pennsylvania, 1999.	n/a
Archsmith	James	Full Member	B.S., University of Michigan, 1992; M.A., University of Michigan, 2011; Ph.D., University of California, 2018	Assistant Professor, Agricultural and Resource Economics

Arevalo	Richard	Special Member	B.S., Geology, University of Florida, 2005; Ph.D., Geochemistry, University of Maryland, 2010.	n/a
Arevalo JR	Ricardo David	Full Member	B.S., University of Florida, 2005; Ph.D., University of Maryland, College Park, 2010	Associate Professor, Geology
Arias	Jonathan A.	Full Member	B.A., State University of New York-College at Purchase, 1981; M.S.,Purdue University, 1982; Ph.D., University of Colorado-Boulder, 1990.	n/a
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- ENFP - Engineering, Fire Protection (p. 827)
- ENGL - English (p. 829)
- ENMA - Engineering, Materials (p. 835)
- ENME - Engineering, Mechanical (p. 842)
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- ENPM - Engineering, Professional Masters (p. 850)
- ENPP - Engineering and Public Policy (p. 857)
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- ENST - Environmental Science and Technology (p. 860)
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F

- FILM - Film Studies (p. 871)
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G

- GEOG - Geographical Sciences (p. 877)
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- GREK - Greek (p. 890)
- GVPT - Government and Politics (p. 890)

H

- HACS - ACES-Cybersecurity (p. 895)
- HEBR - Hebrew (p. 895)
- HESI - Higher Ed, Student Affairs, and International Ed Policy (p. 895)
- HESP - Hearing and Speech Sciences (p. 896)
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- HLTH - Health (p. 911)

I

- IMMR - Immigration Studies (p. 914)
- INFM - Information Management (p. 914)
- INST - Information Studies (p. 916)
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J

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K

- KNES - Kinesiology (p. 932)
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L

- LARC - Landscape Architecture (p. 935)
- LASC - Certificate in Latin American Studies (p. 937)
- LATN - Latin (p. 938)
- LBSC - Library Science (p. 938)
- LGBT - Lesbian Gay Bisexual Transgender Studies (p. 940)
- LING - Linguistics (p. 941)

M

- MAIT - Masters in the Mathematics of Advanced Industrial Tech (p. 943)
- MATH - Mathematics (p. 944)
- MEES - Marine-Estuarine-Environmental Sciences (p. 949)
- MIEH - Maryland Institute for Applied Environmental Health (p. 951)
- MITH - Maryland Institute for Technology in the Humanities (p. 953)
- MLAW - MPower Undergraduate Law Programs (p. 953)
- MOCB - Molecular and Cell Biology (p. 953)
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- MUED - Music Education (p. 954)
- MUET - Ethnomusicology (p. 955)
- MUSC - School of Music (p. 955)
- MUSP - Music Performance (p. 961)

N

- NACS - Neuroscience & Cognitive Science (p. 961)
- NAVY - Navy (p. 962)
- NFSC - Nutrition and Food Science (p. 962)
- NRMT - Natural Resources Management (p. 965)

P

- PERS - Persian (p. 965)
- PHIL - Philosophy (p. 965)
- PHSC - Public Health Science (p. 967)
- PHYS - Physics (p. 968)
- PLCY - Public Policy (p. 971)
- PLSC - Plant Sciences (p. 975)
- PORT - Portuguese (p. 978)
- PSYC - Psychology (p. 979)
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R

- RDEV - Real Estate Development (p. 990)
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- RUSS - Russian (p. 992)

S

- SLAA - Second Language Acquisition and Application (p. 993)
- SLAV - Slavic (p. 994)
- SLLC - School of Languages, Literatures and Cultures (p. 995)
- SOCY - Sociology (p. 996)
- SPAN - Spanish (p. 1000)
- SPHL - Public Health (p. 1003)
- STAT - Statistics and Probability (p. 1004)
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T

- TDPS - Theatre, Dance and Performance Studies (p. 1012)
- THET - Theatre (p. 1012)
- TLPL - Teaching and Learning, Policy and Leadership (p. 1017)
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U

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- URSP - Urban Studies and Planning (p. 1032)
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V

- VMSC - Veterinary Medical Sciences (p. 1034)

W

- WMST - Women's Studies (p. 1035)

AASP - African American Studies

AASP400 Directed Readings in African American Studies (3 Credits)
The readings will be directed by the faculty of African American Studies. Topics to be covered will be chosen to meet the needs and interests of individual students.
Prerequisite: AASP202 or AASP100.

AASP402 Classic Readings in African American Studies (3 Credits)
Classic readings of the social, economic and political status of blacks and other minorities in the United States and the Americas.
Prerequisite: AASP202 or AASP100.

AASP411 Black Resistance Movements (3 Credits)
A comparative study of the black resistance movements in Africa and America; analysis of their interrelationships as well as their impact on contemporary pan-Africanism.
Prerequisite: AASP100.

AASP441 Science, Technology, and the Black Community (3 Credits)
Scientific knowledge and skills in solving technological and social problems, particularly those faced by the black community. Examines the evolution and development of African and African American contributions to science. Surveys the impact of technological changes on minority communities.
Prerequisite: HIST255, AASP202, or AASP100; or permission of BSOS-African American Studies department.

AASP443 Blacks and the Law (3 Credits)
The relationship between black Americans and the law, particularly criminal law, criminal institutions and the criminal justice system. Examines historical changes in the legal status of blacks and changes in the causes of racial disparities in criminal involvement and punishments.
Prerequisite: HIST255, AASP202, or AASP100; or permission of BSOS-African American Studies department.

AASP468 Special Topics in Africa and the Americas (3 Credits)
Cultural, historical and artistic dimensions of the African experience in Africa and the Americas.
Repeatable to: 6 credits if content differs.

AASP478 Humanities Topics in African American Studies (3 Credits)
Advanced studies in the humanities, often requiring prerequisites, focusing on the literary, artistic and philosophical contributions of Africans and African Americans.
Repeatable to: 6 credits if content differs.

AASP483 Gender, Sexuality and the Black Family (3 Credits)
Examining the historical, economic, social, and scholarly construction of African American family structures. The problematization of "Black matriarchy," hetero- and homosexuality, bi-racialism, and other efforts to "normalize" African Americans to conform to Eurocentric and religious concepts of family will be critically analyzed.
Prerequisite: AASP100.
Credit Only Granted for: AASP483 or AASP498F.
Formerly: AASP498F.

AASP493 Feminist and Nationalist Thought in Black Communities (3 Credits)
The historical and theoretical foundations of feminist and nationalist thought in Black Communities will be examined. Further, we will discover why feminist and nationalist thought has been routinely ignored or misrepresented as disparate, if not oppositional, themes in Black intellectual and political life.
Prerequisite: AASP101 or AASP100.
Credit Only Granted for: AASP493 or AASP499W.
Formerly: AASP499W.

AASP498 Special Topics in Black Culture (3 Credits)
Advanced study of the cultural and historical antecedents of contemporary African and African American society. Emphasis on the social, political, economic and behavioral factors affecting blacks and their communities. Topics vary.
Prerequisite: AASP202 or AASP100.
Repeatable to: 6 credits if content differs.

AASP499 Advanced Topics in Public Policy and the Black Community (3 Credits)
Examination of specific areas of policy development and evaluation in black and other communities. Application of advanced tools of policy analysis, especially quantitative, statistical and micro-economic analysis.
Prerequisite: AASP301; or permission of BSOS-African American Studies department.
Repeatable to: 6 credits if content differs.

AASP602 Interdisciplinary Research Methods in Afro-American Studies (3 Credits)
The purpose of this course is to familiarize graduate students with both the interdisciplinary and multidisciplinary approaches that academics employ when producing scholarship in the field of Afro-American Studies. This will examine the contours of the field with an emphasis on work in both the social sciences and the arts and humanities.
Restriction: Permission of BSOS-African American Studies department; or permission of EDUC-Education Policy and Leadership department.

AASP611 Classic Texts and Contemporary Issues (3 Credits)
Through a review and analysis of classic texts of Black intellectuals, artists, writers, and activists, students will examine the compelling themes in African American life and scholarship.
Restriction: Permission of BSOS-African American Studies department.

AASP621 Public Policy and Black Communities (3 Credits)
This course explores the role of race in social policy formation and emphasizes the importance of both political institutions and economic relations as determinants of the policy making process and context.
Restriction: Permission of BSOS-African American Studies department.

AAST - Asian American Studies

AAST420 Asian American Women: The Social Construction of Gender (3 Credits)
Examines the intersection of gender, race and class as it relates to Asian American women in the United States; how institutionalized cultural and social statuses of gender, race, ethnicity and social class produce and reproduce inequality with implications for Asian Americans and the broader society.
Restriction: Must not have completed WMST420. Also offered as: WMST420.
Credit Only Granted for: AAST420 or WMST420.

AAST424 Sociology of Race Relations (3 Credits)
Analysis of race-related issues, with a primary focus on American society. The historical emergence, development, and institutionalization of racism; the impact of racism on its victims; and racially based conflict.
Prerequisite: 6 credits in SOCY courses; or permission of UGST-Undergraduate Studies.
Restriction: Must not have completed SOCY424. Also offered as: SOCY424.
Credit Only Granted for: AAST424 or SOCY424.

AAST443 Asian American Politics (3 Credits)
Students will gain a greater understanding of 1)the role of Asian Americans in US politics, 2) the political attitudes and behaviors of Asian Americans and 3)how to conduct research on Asian American politics. Though the class will concentrate on Asian Americans, issues related to Asian American politics will be examined within the larger context of America's multicultural political landscape.
Credit Only Granted for: AAST498T, AAST443, GVPT368C or AMST 498J.
Formerly: AAST498T.

AAST498 Advanced Topics in Asian American Studies (3 Credits)
Advanced study of the cultural and historical antecedents of contemporary Asian American society. Emphasis on the social, political, economic, and behavioral factors affecting Asian Americans and their communities.
Repeatable to: 6 credits if content differs.

AAST499 Senior Thesis (3 Credits)
Under the supervision of faculty, research regarding a specific topic of the Asian American experience will be completed.
Prerequisite: AAST201 and AAST200.
Restriction: Permission of UGST-Undergraduate Studies; and must be in Asian American Studies program.
Repeatable to: 6 credits if content differs.

AGNR - Agriculture and Natural Resources

AGNR489 Field Experience (1-4 Credits)
Credit according to time scheduled and organization of the course. A lecture series organized to study in depth a selected phase of agriculture not normally associated with one of the existing programs.
Restriction: Permission of AGNR-College of Agriculture & Natural Resources.
Repeatable to: 4 credits if content differs.
Formerly: AGRI489.

AGNR499 Special Problems (1-3 Credits)

AGNR606 Program Planning and Evaluation in Agricultural Education (2-3 Credits)
Second semester. Analysis of community agricultural education needs, selection and organization of course content, criteria and procedures for evaluating programs.
Formerly: AGRI606.

AGNR630 Teaching-Learning in Adult and Continuing Education (3 Credits)
The teaching/learning process in adult continuing education. Instructional techniques and methodologies appropriate for adults. The curriculum development process. Issues and priorities in adult continuing education.
Formerly: AGRI630.

AGNR661 Rural Community Analysis (3 Credits)
Communities as social systems composed of organizations which interact in a system of cultural institutions, norms, and values. Functional and structural linkages between organizations within as well as outside the community; rural vs. urban similarities and differences; and the role of the social processes such as competition, cooperation and conflict in the context of community power and leadership structure.
Formerly: AGRI661.

AGNR699 Special Problems (1-3 Credits)

AGNR789 Special Topics (1-3 Credits)

AGNR798 Seminar in Rural Education (1-3 Credits)
Problems in the organization, administration, and supervision of the several agencies of rural and/or vocational education.
Repeatable to: 8 credits if content differs.
Formerly: AGRI798.

AGNR799 Master's Thesis Research (1-6 Credits)

AGNR888 Apprenticeship in Education (1-8 Credits)
Apprenticeships in the major area of study are available to selected students whose application for an apprenticeship has been approved by the education faculty. Each apprentice is assigned to work for at least a semester full-time or the equivalent with an appropriate agency. The sponsor of the apprentice maintains a close working relationship with the apprentice and the other persons involved.
Prerequisite: Must have completed 6 credits in Education at the University of Maryland.
Restriction: Must have experience and must have a master's degree.
Formerly: AGRI888.

AGNR889 Internship in Education (3-8 Credits)
Internships in the major area of study for experienced students who are assigned to an appropriate school system, educational institution, or agency in a situation different than that in which the student is regularly employed.
Formerly: AGRI889.

AGNR899 Doctoral Dissertation Research (1-8 Credits)

AMSC - Applied Mathematics & Scientific Computation

AMSC420 Mathematical Modeling (3 Credits)
The course will develop skills in data-driven mathematical modeling through individual and group projects. Emphasis will be placed on both analytical and computational methods, and on effective oral and written presentation of results.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461); and 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (MATH246, MATH341); and minimum grade of C- in STAT400. And 1 course with a minimum grade of C- from (CMSC106, CMSC131); or students who have taken courses with comparable content may contact the department. Also offered as: MATH420.
Credit Only Granted for: AMSC420 or MATH420.

AMSC452 Introduction to Dynamics and Chaos (3 Credits)
An introduction to mathematical dynamics and chaos. Orbits, bifurcations, Cantor sets and horseshoes, symbolic dynamics, fractal dimension, notions of stability, flows and chaos. Includes motivation and historical perspectives, as well as examples of fundamental maps studied in dynamics and applications of dynamics.
Prerequisite: MATH246 and MATH240. Also offered as: MATH452.
Credit Only Granted for: AMSC452 or MATH452.

AMSC460 Computational Methods (3 Credits)
Basic computational methods for interpolation, least squares, approximation, numerical quadrature, numerical solution of polynomial and transcendental equations, systems of linear equations and initial value problems for ordinary differential equations. Emphasis on methods and their computational properties rather than their analytic aspects. Intended primarily for students in the physical and engineering sciences.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241); and 1 course with a minimum grade of C- from (CMSC106, CMSC131). Also offered as: CMSC460.
Credit Only Granted for: AMSC460, CMSC460, AMSC466, or CMSC466.

AMSC466 Introduction to Numerical Analysis I (3 Credits)
Floating point computations, direct methods for linear systems, interpolation, solution of nonlinear equations.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241); and 1 course with a minimum grade of C- from (CMSC106, CMSC131). Also offered as: CMSC466.
Credit Only Granted for: AMSC460, CMSC460, AMSC466, or CMSC466.

AMSC498 Selected Topics in Applied Mathematics (1-3 Credits)
Topics in applied mathematics of special interest to advanced undergraduate students.
Repeatable to: 6 credits if content differs.

AMSC660 Scientific Computing I (3 Credits)
Monte Carlo simulation, numerical linear algebra, nonlinear systems and continuation method, optimization, ordinary differential equations. Fundamental techniques in scientific computation with an introduction to the theory and software of each topic.
Prerequisite: Must have knowledge of C or Fortran. And AMSC460 or CMSC460; or (CMSC466 or AMSC466); or (must have knowledge of basic numerical analysis (linear equations, nonlinear integration, interpolation); and permission of instructor). Also offered as: CMSC660.
Credit Only Granted for: AMSC660 or CMSC660.

AMSC661 Scientific Computing II (3 Credits)
Fourier and wavelet transform methods, numerical methods for elliptic partial differential equations, numerical linear algebra for sparse matrices. Finite element methods, numerical methods for tiem dependent partia l differential equations. Techniques for scientific computation with an introduction to the theory and software for each topic. Course is part of a two course sequence (660 and 661), but can be taken independently.
Prerequisite: Must have knowledge of C or Fortran. And AMSC460 or CMSC460; or (CMSC466 or AMSC466); or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Also offered as: CMSC661.
Credit Only Granted for: AMSC661 or CMSC661.

AMSC662 Computer Organization and Programming for Scientific Computing (3 Credits)
This course presents fundamental issues of computer hardware, software, parallel computing, and scientific data management for programming for scientific computation.
Prerequisite: Must have knowledge of C or Fortran. And AMSC460 or CMSC460; or (CMSC466 or AMSC466); or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Also offered as: CMSC662.
Credit Only Granted for: AMSC662 or CMSC662.

AMSC663 Advanced Scientific Computing I (3 Credits)
In the sequence AMSC663, AMSC664 students work on a year-long individual project to develop software for a scientific task in a high performance computing environment. Lectures will be given on available computational environments, code development, implementation of parallel algorithms.
Prerequisite: CMSC660 or AMSC660; and (CMSC661 or AMSC661).
Restriction: Permission of instructor. Also offered as: CMSC663.
Credit Only Granted for: AMSC663 or CMSC663.

AMSC664 Advanced Scientific Computing II (3 Credits)
In the sequence AMSC 663, AMSC 664 students work on a year-long individual project to develop software for a scientific task in a high performance computing environment. Lectures will be given on code development and validation, parallel algorithms for partial differential equations, nonlinear systems, optimization.
Prerequisite: AMSC663.
Restriction: Permission of instructor. Also offered as: CMSC664.
Credit Only Granted for: AMSC664 or CMSC664.

AMSC666 Numerical Analysis I (3 Credits)
Approximation theory, numerical solution of initial-value problems, iterative methods for linear systems, optimization.
Prerequisite: CMSC466 or AMSC466; and MATH410. Also offered as: CMSC666.
Credit Only Granted for: AMSC666 or CMSC666.

AMSC667 Numerical Analysis II (3 Credits)
Numerical solution of initial value problems, numerical solution of boundary value problems, iterative methods for linear systems of equations, numerical methods for eigenvalue problems.
Prerequisite: AMSC666 or CMSC666. Also offered as: CMSC667.
Credit Only Granted for: AMSC667 or CMSC667.

AMSC670 Ordinary Differential Equations I (3 Credits)
Existence and uniqueness, linear systems usually with Floquet theory for periodic systems, linearization and stability, planar systems usually with Poincare-Bendixson theorem.
Prerequisite: MATH405. And MATH410; or students who have taken courses with comparable content may contact the department. Also offered as: MATH670.
Credit Only Granted for: AMSC670 or MATH670.

AMSC671 Ordinary Differential Equations II (3 Credits)
The content of this course varies with the interests of the instructor and the class. Stability theory, control, time delay systems, Hamiltonian systems, bifurcation theory, and boundary value problems.
Prerequisite: MATH630. And MATH670 or AMSC670; or students who have taken courses with comparable content may contact the department. Also offered as: MATH671.
Credit Only Granted for: AMSC671 or MATH671.

AMSC673 Partial Differential Equations I (3 Credits)
Analysis of boundary value problems for Laplace's equation, initial value problems for the heat and wave equations. Fundamental solutions, maximum principles, energy methods. First order nonlinear PDE, conservation laws. Characteristics, shock formation, weak solutions. Distributions, Fourier transform.
Prerequisite: MATH411; or students who have taken courses with comparable content may contact the department. Also offered as: MATH673.
Credit Only Granted for: AMSC673 or MATH673.

AMSC674 Partial Differential Equations II (3 Credits)
Boundary value problems for elliptic partial differential equations via operator-theoretic methods. Hilbert spaces of functions. Duality, weak convergence. Sobolev spaces. Spectral theory of compact operators. Eigenfunction expansions.
Prerequisite: MATH673 or AMSC673; or permission of instructor. Also offered as: MATH674.
Credit Only Granted for: AMSC674 or MATH674.

AMSC689 Research Interactions in Applied Mathematics and Scientific Computation (1-3 Credits)
The students participate in a vertically integrated (undergraduate, graduate and/or postdoctoral, faculty) research group. Format varies, but includes regular meetings, readings and presentations of material. See graduate program's online syllabus or contact the graduate program director for more information.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

AMSC698 Advanced Topics in Applied Mathematics (1-4 Credits)

AMSC699 Applied Mathematics Seminar (1-3 Credits)
Seminar to acquaint students with a variety of applications of mathematics and to develop skills in presentation techniques.
Repeatable to: 99 credits if content differs.

AMSC714 Numerical Methods For Stationary PDEs (3 Credits)
Topics include: Maximum principle, finite difference method, upwinding, error analysis; Variational formulation of elliptic problems, inf-sup theory; The finite element method and its implementation; Piecewise polynomial interpolation theory in Sobolev spaces; A priori and a posteriori error analyses, adaptivity; Fast solvers; Variational crimes; Mixed finite element methods.
Prerequisite: One graduate level course in partial differential equations or one graduate level course in numerical analysis or scientific computing; or permission of instructor.
Credit Only Granted for: AMSC 714 or AMSC 614.
Formerly: AMSC614.
Additional Information: This course is a complement to the graduate courses MATH 673 and MATH 674 in PDEs, AMSC 666 in numerical analysis, and AMSC 660 and AMSC 661 in scientific computing.

AMSC715 Numerical Methods for Evolution Partial Differential Equations (3 Credits)
Topics include: Heat and wave equations: maximum principle, energy methods and Sobolev spaces, finite difference and finite element methods, von Neumann analysis, stability and error estimates;Linear first order PDEs: upwinding and monotone schemes, finite difference, finite volume, and discontinuous Galerkin methods; Nonlinear conservation laws: weak solutions and entropy conditions,monotone methods.
Prerequisite: Permission of instructor; or one graduate level course in partial differential equations or one graduate level course in numerical analysis or scientific computing.
Credit Only Granted for: AMSC612 or AMSC715.
Formerly: AMSC612.
Additional Information: This course continues AMSC 714, but can be taken independently, and is a complement to the graduate courses MATH 673 and MATH 674 in PDEs, AMSC 666 in numerical analysis, and AMSC 660 and AMSC 661 in scientific computing.

AMSC760 Applied Statistics Practicum (3 Credits)
A semester long applied applied statistical project (a minimum 10 hours per week or 120 hours in total), in an internship of collaborative research-laboratory setting working on a substantive applied quantitative project with significant statistical content.
Prerequisite: Must have completed one year of graduate study in Applied Statistics.
Restriction: Must have project proposal approved by SAC coordinator.

AMSC761 Applied Statistics Seminar (1 Credit)
Seminar taught once yearly on a rotating basis by faculty engaged in the Applied Statistics area. Required of AMSC Applied Statistics area doctoral students within one year following the completion of their practicum project, AMSC760, and open only to Applied Statistics Area students. The seminar will include sessions on presentation skills, but will consist primarily of oral presentations of students' past Practicum project results. Students attend throughout the term, give one talk (at least 1/2 hour).
Recommended: STAT700 or STAT701; and (STAT740 or STAT741).

AMSC762 Data Analysis Project (1 Credit)
This course cannot be used to meet any of the Applied Statistics Area's seminar requirements. Offered yearly, required of and limited to MS non-thesis and doctoral students in Applied Statistics Area, for whom the resulting projects serve as a Qualifying Exam component. After 5-6 lectures or presentations on components of successful data analyses and write-ups, 3-4 sessions will discuss previous student project submissions. The culminating project, to be completed in a two week period between semesters, is an analysis and written report of one of three project choices made available each year to represent a spectrum of realistic applied statistical problems.
Restriction: Permission of CMNS-Applied Mathematics department; and permission of instructor.

AMSC763 Advanced Linear Numerical Analysis (3 Credits)
Advanced topics in numerical linear algebra, such as dense eigenvalue problems, sparse elimination, iterative methods, and other topics.
Prerequisite: AMSC666 or CMSC666; or permission of instructor. Also offered as: CMSC760.
Credit Only Granted for: AMSC600 or CMSC760; AMSC763 or CMSC763;.
Formerly: AMSC600.

AMSC764 Advanced Numerical Optimization (3 Credits)
Modern numerical methods for solving unconstrained and constrained nonlinear optimization problems in finite dimensions. Design of computational algorithms and the analysis of their properties.
Prerequisite: MATH410; or permission of instructor. Also offered as: CMSC764.
Credit Only Granted for: AMSC607, AMSC764 or CMSC764.
Formerly: AMSC607.

AMSC799 Master's Thesis Research (1-6 Credits)

AMSC808 Advanced Topics in Applied Mathematics (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

AMSC819 Applied Mathematics Seminar (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

AMSC898 Pre-Candidacy Research (1-8 Credits)

AMSC899 Doctoral Dissertation Research (1-8 Credits)

AMST - American Studies

AMST418 Cultural Themes in America (3 Credits)
Examination of structure and development of American culture through themes such as "growing up American," "culture and mental disorders," "race," "ethnicity," "regionalism," "landscape," and "humor."
Repeatable to: 6 credits if content differs.

AMST428 American Cultural Eras (3 Credits)
Investigation of a decade, period, or generation as a case study in significant social change within an American context. Case studies include "Antebellum America, 1840-1860" and "American culture in the Great Depression."
Repeatable to: 6 credits if content differs.

AMST429 Perspectives on Popular Culture (3 Credits)
Topics in popular culture studies, including the examination of particular genres, themes, and issues.
Repeatable to: 6 credits if content differs.

AMST450 Seminar in American Studies (3 Credits)
Developments in theories and methods of American Studies scholarship, with emphasis upon interaction between the humanities and the social sciences in the process of cultural analysis and evaluation.
Prerequisite: AMST201 and AMST340; and 1 course in AMST.
Restriction: Senior standing; and must be in American Studies program.

AMST498 Special Topics in American Studies (3 Credits)
Topics of special interest.
Repeatable to: 9 credits if content differs.

AMST499 Independent Studies (1-3 Credits)
Provides the student with the opportunity to pursue independent, interdisciplinary research and reading in specific areas of American culture studies.
Restriction: Permission of ARHU-American Studies department; and must be in American Studies program.
Repeatable to: 6 credits if content differs.

AMST601 Introductory Theories and History in American Studies (3 Credits)
Explores the formative literature, theories, research approaches, and history of American Studies.
Restriction: Must not be a Graduate Advanced Special Student.

AMST603 Current Approaches to American Studies (3 Credits)
Builds on AMST601 and explores contemporary literature, theory, and intellectual issues in American Studies.
Restriction: Must be in one of the following programs (American Studies (Master's); American Studies (Doctoral)) . Or permission of ARHU-American Studies department; and permission of instructor.

AMST628 Seminar in American Studies (3 Credits)

AMST629 Seminar in American Studies (3 Credits)

AMST638 Orientation Seminar: Material Aspects of American Civilization (3 Credits)
Class meets at the Smithsonian.

AMST639 Reading Course in Selected Aspects of American Civilization (3 Credits)
Class meets at the Smithsonian.

AMST650 Material Culture Studies Theory (3 Credits)
Readings and analysis of canonical and current scholarly approaches to the study of material culture. Covers a wide range of material culture genres and subfields, and focuses on artifacts and the built environment.

AMST655 Introduction to Museum Scholarship (3 Credits)
Provides students a basic understanding of museums as cultural and intellectual institutions. Topics include the historical development of museums, museums as resources for scholarly study, and the museum exhibition as medium for presentation of scholarship.Also offered as: HIST610, ANTH655.
Credit Only Granted for: AMST655, ANTH655, or HIST610.

AMST698 Directed Readings in American Studies (3 Credits)
This course is designed to provide students with the opportunity to pursue independent, interdisciplinary research and reading in specific aspects of American culture under the supervision of a faculty member.
Repeatable to: 6 credits if content differs.

AMST798 Non-Thesis Research (1-3 Credits)

AMST799 Master's Thesis Research (1-6 Credits)

AMST851 Interpretation of Cultural Landscapes (3 Credits)
A research seminar that provides students an opportunity to survey the principal approaches to studying a cultural landscape, learn how to apply and adapt a field research method, and produce a primary research report on a cultural landscape of their choice.

AMST856 Museum Research Seminar (3 Credits)
A research seminar focusing on the practice and presentation of cultural and historical scholarship in museums and historical sites. Students will complete an original research project on the challenges and opportunities of public exhibition and interpretation of cultural and historical research.
Prerequisite: AMST655. Also offered as: ANTH856, HIST810.
Credit Only Granted for: AMST856, HIST810, or ANTH856.

AMST857 Museum Scholarship Practicum (3-6 Credits)
Students devise and carry out a research program using the collections at the Smithsonian Institution or some other cooperating museum, working under joint supervision of a museum professional and a university faculty member.
Prerequisite: AMST856; and permission of Museum Scholarship Program required. Also offered as: ANTH857, HIST811.
Credit Only Granted for: AMST857, ANTH857, or HIST811.

AMST878 American Studies Pedagogy Mentoring (1-3 Credits)
This course provides graduate teaching assistants with a structured approach to pedagogical content, techniques, and collaborative practices that they learn and then can use throughout their careers. It also commits a core faculty member to teaching pedagogy and makes it possible for the course to become a formal part of one's load.
Restriction: Must be an AMST graduate assistant.
Repeatable to: 12 credits.

AMST898 Pre-Candidacy Research (1-8 Credits)

AMST899 Doctoral Dissertation Research (1-8 Credits)

ANSC - Animal Science

ANSC410 The Gut Microbiome and its Roles in Health and Disease (3 Credits)
A comprehensive perspective of the role of gut microbiome/microflora in nutrition, metabolism, disease prevention and health issues including farm animal health and food value, and human gastrointestinal health and immunity.
Prerequisite: BSCI223, ANSC212, ANSC327, EPIB301, BSCI222, BSCI421, or NFSC430; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ANSC489M or ANSC410.
Formerly: ANSC489M.

ANSC420 Critical Thinking in Animal Science (3 Credits)
Employ methods to systematically solve selected problems that typically arise on farms or allied businesses related to animal enterprises.
Prerequisite: ANSC314.
Recommended: AREC306 and AREC250.
Restriction: Junior standing or higher.

ANSC435 Experimental Embryology (3 Credits)
Experimental approaches to mammalian embryology with emphasis on domestic livestock systems as applied to research and production systems. Lab will include hands-on experiments and demos of in vitro embryo production, embryo splitting, cell injection and nuclear transfer.
Prerequisite: ANSC212.
Recommended: Completion of one course in reproductive physiology is recommended.
Credit Only Granted for: ANSC435 or ANSC489M.
Formerly: ANSC489M.

ANSC437 Animal Biotechnology (3 Credits)
Key concepts and current issues in animal biotechnology are covered. Current techniques and applications systems as well as social, ethical, and regulatory issues associated with biotechnology will be discussed.
Prerequisite: ANSC327; or students who have taken courses with comparable content may contact the department.

ANSC440 Zoonotic Diseases and Control (3 Credits)
Global perspective of foodborne diseases common to animals and man, specifically those caused by farm animal-originated human pathogens (zoonoses) and their control. A selection of important zoonoses and food safety issues will be specifically covered with an emphasis on the principles of zoonotic disease transmission and control, risk factors to humans, and surveillance methods.
Prerequisite: BSCI223, ANSC212, ANSC327, BSCI222, BSCI421, or NFSC430; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ANSC440 or ANSC489R.
Formerly: ANSC489R.

ANSC443 Physiology of Lactation (3 Credits)
A comprehensive survey of lactation in laboratory and domestic animals. Other species are discussed where possible. Emphasis will be placed on physiological aspects of milk synthesis and secretion and on the cellular and molecular biology of mammary gland development.
Prerequisite: CHEM231, ANSC212, and CHEM232.
Recommended: BCHM463.

ANSC444 Domestic Animal Endocrinology (3 Credits)
Current developments in endocrinology as it relates to animals used in the production of food and other products important to the well being of humans will be covered.
Prerequisite: ANSC212; or permission of instructor.
Restriction: Must not have completed ANSC644.
Credit Only Granted for: ANSC489I, ANSC444, or ANSC644.
Formerly: ANSC489I.

ANSC446 Physiology of Mammalian Reproduction (3 Credits)
Anatomy and physiology of reproductive processes in domesticated and wild mammals.
Prerequisite: ANSC212 or BSCI440.

ANSC447 Physiology of Mammalian Reproduction Laboratory (1 Credit)
Gross and micro-anatomy, artificial insemination, estrous cycle synchronization and invitro-fertilization procedures and analytical techniques useful in animal management and reproduction.
Prerequisite: Must have completed or be concurrently enrolled in ANSC446.

ANSC450 Animal Breeding Plans (3 Credits)
Design of animal breeding programs for the genetic improvement of livestock and companion animal species. Principles of population and quantitative genetics. Genetic evaluations of animals, selection strategies and crossbreeding systems. Incorporation of statistics and biotechnology into animal breeding plans.
Prerequisite: 1 course with a minimum grade of C- from (MATH120, MATH130, MATH136, MATH140).
Restriction: Junior standing or higher.

ANSC452 Avian Physiology (3 Credits)
The digestive, excretory, respiratory, circulatory, immune, skeletal muscle, endocrine and nervous systems of avian species will be examined.
Prerequisite: ANSC212.
Restriction: Junior standing or higher.

ANSC453 Animal Welfare and Bioethics (3 Credits)
Ethical concerns related to the use of animals in modern society. Historical and philosophical overview of animal welfare and bioethics. Applied ethical discussions on human/animal interrelationships, physical and genetic manipulation, and other current issues associated with the treatment of animals used in food production, research, zoos, and as pets.
Prerequisite: ANSC101 and ANSC103; or BSCI106; or (BSCI160 and BSCI161); or permission of instructor.
Restriction: Junior standing or higher.

ANSC455 Applied Animal Behavior (3 Credits)
Principles of animal behavior applied to production systems in animal agriculture.
Prerequisite: ANSC101 and ANSC103; or BSCI106; or (BSCI160 and BSCI161).

ANSC460 Comparative Vertebrate Immunology (3 Credits)
Basic concepts in immunology, and comparing immunity in different vertebrates, including organization of immune systems, innate and adaptive immune responses. Special attention will be paid to how cell-mediated and humoral immune responses are induced in natural infections, and what are the effector mechanisms in both of these processes. Immune response in representative disease models such as infections with viruses and bacteria, cancer, and autoimmune disease will be discussed. Lectures concerning cutting-edge research will also be given.
Prerequisite: ANSC212, BSCI201, or BSCI440.
Credit Only Granted for: ANSC460 or ANSC489I.
Formerly: ANSC489I.

ANSC489 Current Topics in Animal Science (1-3 Credits)
Examination of current developments in the animal sciences.
Repeatable to: 6 credits if content differs.

ANSC497 Animal Biotechnology Recombinant DNA Laboratory (3 Credits)
An advanced course offering hands-on experience in performing recombinant DNA experiments. Current molecular biology techniques used for cloning genes, analyzing the gene products, and modifying the genes of animals will be performed. Techniques include isolation of DNA, use of restriction enzymes; cloning procedures, PCR analysis, and Southern hybridizations. Lecture material focuses on interpretation of results generated in the laboratory.
Prerequisite: ANSC327; or students who have taken courses with comparable content may contact the department.
Recommended: ANSC437 and ANSC435.

ANSC627 Molecular and Quantitative Genetics (3 Credits)
Classical, molecular, and population genetics with specific emphasis on animal systems will be covered. Also, disseminate information on molecular approaches for manipulating genetics at the whole animal level (transgenic and cloning). Other model organisms will be discussed to provide a conceptual framework.

ANSC644 Molecular and Cellular Endocrinology (3 Credits)
A comprehensive course covering the major endocrine systems in animals. Lecture topics include major endocrine axes, hormonal regulation of homeostasis, growth and reproduction, and endocrine mechanisms of action. Advanced concepts in the molecular and cell biology of hormone action and regulation addressed in weekly discussion sessions centered on current research publications in the field of molecular and cellular endocrinology.
Restriction: Must not have completed ANSC444.
Credit Only Granted for: ANSC444,ANSC489I, ANSC644, or ANSC688I.
Formerly: ANSC688I.

ANSC660 Poultry Literature (1-4 Credits)
Readings on individual topics are assigned. Written reports required. Methods of analysis and presentation of scientific material are discussed.

ANSC688 Special Topics (1-4 Credits)
Lectures, experimental courses, and other special subjects in the fields of animal sciences and veterinary medicine.
Repeatable to: 4 credits.

ANSC698 Seminar (1 Credit)
Students are required to prepare papers based upon current scientific publications relating to animal science, or upon their research work, for presentation before and discussion by the class; (1) recent advances; (2) nutrition; (3) physiology; (4) biochemistry.

ANSC699 Special Problems in Animal Science (1-2 Credits)
Work assigned in proportion to amount of credit. Prerequisite: approval of staff. Problems will be assigned which relate specifically to the character of work the student is pursuing.

ANSC799 Master's Thesis Research (1-6 Credits)

ANSC898 Pre-Candidacy Research (1-8 Credits)

ANSC899 Doctoral Dissertation Research (1-8 Credits)

ANTH - Anthropology

ANTH411 Anthropology of Immigration and Health (3 Credits)
The United Nations estimates that some 230 million people around the world are migrants who live outside their country of birth. This course focuses on these migrant populations, considering the implications of movement across borders and settlement in new societies on their health and well-being. We will investigate the social, political, and economic structures that shape disease and illness and produce differential access to health care for migrants. Within that context, we will explore the health effects of migration itself and particular health conditions from which migrants suffer. We will also examine how migrants interface with differently configured health care systems as well as strategies they and their advocates use to promote health and well-being.Also offered as: ANTH611.
Credit Only Granted for: ANTH411 or ANTH611.

ANTH412 Hypermarginality and Urban Health (3 Credits)
Using perspectives from medical and urban anthropology, we examine the phenomenon of hypermarginality--the clustering of extreme poverty, chronic disease, addiction, violence and trauma in certain social and spatial contexts, often urban. We will explore both the broader social, political, and economic structures of exclusion that produce hypermarginality, as well as the illness experiences associated with these conditions. As we consider both social suffering and the related institutional responses, we will also discuss the role of anthropological approaches in national discussions about health inequities.
Credit Only Granted for: ANTH412 or ANTH612.

ANTH413 Health Disparities in the United States (3 Credits)
Powerful economic, political, social, and cultural forces shape who gets sick, what illnesses/diseases they get, how they are treated while seeking care, what treatment options they have, and what their ultimate health outcomes are. The goal of the course is to understand these processes through the lens of critical medical anthropology
Credit Only Granted for: ANTH468Q, ANTH688Q, ANTH413, or ANTH613.
Formerly: ANTH468Q.

ANTH421 Nutritional Anthropology (3 Credits)
The study of nutrition from an anthropological perspective which includes both biological and cultural aspects of nutrition. We will explore how nutrition can affect culture how culture can affect nutrition. Nutritional anthropology includes the study of cross-cultural variation in diet, nutritional status and subsistence systems as well as variation in these factors over the evolutionary course of human existence, from prehistoric and historic to modem times. Students will be introduced to nutritional anthropology and provided with the basics for assessing reliability and feasibility of nutritional advice and policy encountered in everyday modern life in a global setting.Also offered as: ANTH621.
Credit Only Granted for: ANTH421, ANTH428N, or ANTH621.
Formerly: ANTH428N.

ANTH422 Human-Plant-(Human & Bioactive Plant) Interaction (3 Credits)
This seminar course will discuss the evolutionary, historical, cultural, and ecological aspects of coevolution with respect to humans and their interactions with specific bioactive plants. Case studies of human- plant-(pathogen) interactions will be discussed as well as an inclusive survey of anthropologically important phytochemicals. The seminar incorporates human-plant-(pathogen) interactions into models of human evolution and ecology.
Prerequisite: ANTH220 and ANTH320; or permission of BSOS-Anthropology department.
Credit Only Granted for: ANTH422.
Formerly: ANTH428I.

ANTH428 Special Topics in Bioanthropology (3 Credits)
Advanced research courses in biological anthropology on changing topics that correspond to new theoretical interests, faculty research interests, or the specialties of visiting scholars. Prerequisites or background knowledge vary with the topic. Check with the department for requirements.
Repeatable to: 6 credits if content differs.

ANTH429 Advanced Special Topics in Biological Anthropology (3 Credits)
Upper level biological anthropology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Repeatable to: 6 credits if content differs.

ANTH438 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ANTH440 Theory and Practice of Historical Archaeology (3 Credits)
Historical archaeology enhances cultural heritage by providing voice for groups who were often unable to record their own histories, such as women, laborers, working class families, and enslaved people. The course provides insight into issues related to race, gender, and ethnicity as they relate to multicultural histories.
Prerequisite: ANTH240. Also offered as: ANTH640.
Credit Only Granted for: ANTH440 or ANTH640.

ANTH441 Archaeology of Diaspora (3 Credits)
Diaspora" is defined, theorized, deconstructed, and employed throughout the social sciences. There are context specific relations that define who leaves, when, and how they are received in the new place of settlement. Over the course of the semester the class will actively and critically examine the relevance of historical archaeology and material culture studies in the understanding of the formation, experiences, and transformation of diasporic groups over time and space.
Prerequisite: ANTH240.
Credit Only Granted for: ANTH448A, ANTH688Z, or ANTH441.
Formerly: ANTH448A.

ANTH442 Public Archeology (3 Credits)
Explores the uses and environments for archaeological work through a discussion of museum, electronic media, heritage settings, outdoor history museums, including the legal environment that offers protection for archaeological remains. The course exposes students to the majority of cultural media within which archaeology is currently practiced. The interdisciplinary course is a survey of the progress made within and beyond anthropology in understanding the function of heritage, public memory, tourism, and the other popular uses of materials from the past, including the progress made in linguistics psychology and other cognitive disciplines in understanding the purpose of the past.
Credit Only Granted for: ANTH442, ANTH448V, or ANTH642.
Formerly: ANTH448V.

ANTH444 Theories of the Past (3 Credits)
The primary purpose is to highlight some of the key achievements made by archaeologists in informing questions of interest to society from 1850 on. Key achievements include how archaeologists understand elements of the past thought to be central to the development of modern socieity. A secondary purpose is to introduce students to the theories used to understand the place of the past in society and the function of answers to questions thought central to modern social life.
Prerequisite: ANTH240. Also offered as: ANTH740.
Credit Only Granted for: ANTH448P, ANTH444, or ANTH740.
Formerly: ANTH448P.

ANTH445 Laboratory Methods in Archaeology (3 Credits)
The processing, curation, cataloging and analysis of data is an important part of any archaeology field project. Students will learn that basics of laboratory techniques necessary for the final analysis and interpretation of field data.
Prerequisite: ANTH496.
Recommended: ANTH240.

ANTH447 Material Culture Studies in Archaeology (3 Credits)
An in-depth introduction to the world of material culture studies with a focus on the methods and theories in historical archaeology. Students will look at archaeological data as historical documents, commodities and as symbols expressing ideas.
Prerequisite: ANTH240.
Credit Only Granted for: ANTH447, ANTH448C, ANTH647, or ANTH689C.
Formerly: ANTH448C.

ANTH448 Special Topics in Archaeology (3 Credits)
Advanced topics in archaeological research, corresponding to new theoretical developments, faculty research interests, or specialties of visiting scholars. Prerequisites may vary with course topic; check with the department for requirements.
Prerequisite: ANTH240.
Repeatable to: 6 credits if content differs.

ANTH449 Advanced Special Topics in Archaeology (3 Credits)
Upper level archaeology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Repeatable to: 6 credits if content differs.

ANTH450 Theory and Practice of Environmental Anthropology (3 Credits)
An overview of contemporary application of cultural theory and methods to environmental problems. Topics include the use of theories of culture, cognitive approaches, discourse analysis, and political ecology. Case studies from anthropology, other social sciences, humanities, conservation, and environmental history are used to demonstrate the applied value of a cultural-environmental approach.
Restriction: Junior standing or higher. Also offered as: ANTH650.
Credit Only Granted for: ANTH450 or ANTH650.

ANTH451 Environmental Archaeology (3 Credits)
An overview of modern environmental archaeology as a tool for the interdisciplinary investigation of past and present global change and to engage the long term past with current issues of sustainability and rapid environmental change.
Credit Only Granted for: ANTH451, ANTH651, ANTH448F, ANTH668F.
Formerly: ANTH448F.

ANTH452 Anthropology and Climate Change (3 Credits)
Human activities now influence ongoing global climatic change, and the outcome remains uncertain for communities and cultures around the world. This interaction between humans and climate provides a rich area of study for anthropologists in an interdisciplinary context. Case studies of historic and contemporary evidence will be used to understand impacts of global climate change and assess opportunities and barriers to successful responses and adaptation.
Prerequisite: ANTH220, ANTH222, ANTH240, or ANTH260.
Credit Only Granted for: ANTH452 or ANTH652.

ANTH453 Archaeology of the Modern City (3 Credits)
An overview of how social scientists, in particular historical archaeologists, approach modern cities as being part of the materiality of the social structure and order.
Prerequisite: ANTH240; or permission of instructor.
Credit Only Granted for: ANTH448Q or ANTH453.
Formerly: ANTH448Q.

ANTH462 Amazon Through Film (3 Credits)
An interdisciplinary course that utilizes film to consider the Amazon basin, its history, peoples, and landscapes through cinematic representations. The course places the films in the context of film history and critical theory. The course takes into consideration the Brazilian, North American, Mexican, European and Argentine creators of the films and their visions of Amazonia, as well as the audiences and markets to which the films are intended.
Credit Only Granted for: ANTH468D or ANTH462.
Formerly: ANTH468D.

ANTH464 Anthropology of Cultural Heritage (3 Credits)
A global exploration of how the past is remade in the present. Covers the breadth of scope and specific interventions of heritage practice at the global scale, including the social, political, economic, and ethical dimensions of cultural heritage.
Prerequisite: ANTH260. Also offered as: ANTH664.
Credit Only Granted for: ANTH469T, ANTH689T, ANTH464, ANTH664.
Formerly: ANTH469T.

ANTH468 Special Topics in Cultural Anthropology (3 Credits)
Advanced courses in varying specialty areas of cultural anthropology that respond to new theoretical developments, faculty research interests, or specialties of visiting scholars.
Repeatable to: 6 credits if content differs.

ANTH469 Advanced Special Topics in Cultural Anthropology (3 Credits)
Upper level cultural anthropology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Repeatable to: 6 credits if content differs.

ANTH472 Medical Anthropology (3 Credits)
An exploration of the cultural, social, economic and political dimensions of health, disease, and illness. These dimensions will be examined through both the health-seeker's and the care-provider's perspectives.
Credit Only Granted for: ANTH472, ANTH468, ANTH672, or ANTH688L.
Formerly: ANTH468L.

ANTH476 Senior Research (3-4 Credits)
Capstone course in which students pursue independent research into a current problem in anthropology, selected with assistance of a committee of faculty. Research leads to the writing of a senior thesis in anthropology.
Restriction: Must be in Anthropology program.
Credit Only Granted for: ANTH476 or ANTH486.

ANTH477 Senior Thesis (3-4 Credits)
Capstone course in which students write a senior thesis on independent research into a current problem in anthropology. The thesis is defined before a committee of faculty.
Prerequisite: ANTH476.
Restriction: Permission of BSOS-Anthropology department; and must be in Anthropology program.
Credit Only Granted for: ANTH477 or ANTH487.

ANTH478 Special Topics in Linguistics (3 Credits)
Advanced courses in specialty areas that respond to new theoretical developments and faculty research interests in linguistics.
Recommended: LING200.
Repeatable to: 6 credits if content differs.

ANTH485 Honors Research Preparation (3 Credits)
Honors Research Preparation is an independent study course during which the Honors candidate will work with their Honors Thesis Advisor to establish not only the structure of the thesis and timeline, but also the formation of Thesis Review Committee.
Restriction: Permission of BSOS-Anthropology department; and must be in Anthropology program; and must be admitted to University Honors Program or Anthropology Honors Program.

ANTH486 Honors Research (3-4 Credits)
Capstone course in which students pursue independent research into a current problem in anthropology, selected with assistance of a committee of faculty. Research leads to the writing of an honors thesis in anthropology.
Restriction: Permission of BSOS-Anthropology department; and must be in Anthropology program; and must be admitted to University Honors Program or Anthropology Honors Program.
Credit Only Granted for: ANTH486 or ANTH476.

ANTH487 Honors Thesis (3-4 Credits)
Capstone course in which students write a thesis on the results of independent research into a current problem in anthropology.
Prerequisite: ANTH486.
Restriction: Permission of BSOS-Anthropology department; and must be in Anthropology program; and must be admitted to University Honors Program or Anthropology Honors Program.
Credit Only Granted for: ANTH487 or ANTH477.

ANTH491 Applied Urban Ethnography (3 Credits)
The focus is on the use of applied ethnographic field methods in community assessment research in urban settings. Also, it will extend beyond most ethnographic training in which the emphasis is on being there, and relying predominantly on the classical ethnographic methods of recursive observations, participant observations, and a variety of approaches to interviewing.
Prerequisite: ANTH260. Also offered as: ANTH617.
Credit Only Granted for: ANTH468B, ANTH491, or ANTH617.
Formerly: ANTH468B.

ANTH492 Anthropology of the Immigrant Life Course (4 Credits)
Explores social issues affecting local immigrant populations through readings, research and service learning. Theorizing immigration as a social policy issue in the U.S. culture, students learn about the specific contributions that anthropology has made to the understanding of immigration: globalization on the one hand, and the context of daily life in local neighborhoods on the other.
Credit Only Granted for: ANTH498N, ANTH492, ANTH689N, or ANTH692.
Formerly: ANTH498N.

ANTH496 Field Methods in Archaeology (6 Credits)
Field training in the techniques of archaeological survey and excavation.

ANTH498 Advanced Field Training in Ethnography (1-8 Credits)
Experience in field research utilizing a variety of ethnographic methods of inquiry.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: ANTH498 or ANTH698.

ANTH601 Applied Anthropology (3 Credits)
An overview of the history and current practices of applied anthropology. This includes relationships between applied anthropology and other major subfields of the profession; the interdisciplinary and public context of applied anthropology; and problems of significance, utility, and ethics associated with applied anthropology.

ANTH606 Qualitative Methods in Applied Anthropology (3 Credits)
An introduction to the use of ethnography and qualitative methods in applied and policy contexts. Qualitative methods discussed include informal and systematic approaches. Students undertake fieldwork in local settings to practice the qualitative methods and to develop analysis and report writing skills.

ANTH611 Anthropology of Immigration and Health (3 Credits)
The United Nations estimates that some 230 million people around the world are migrants who live outside their country of birth. This course focuses on these migrant populations, considering the implications of movement across borders and settlement in new societies on their health and well-being. We will investigate the social, political, and economic structures that shape disease and illness and produce differential access to health care for migrants. Within that context, we will explore the health effects of migration itself and particular health conditions from which migrants suffer. We will also examine how migrants interface with differently configured health care systems as well as strategies they and their advocates use to promote health and well-being.
Credit Only Granted for: ANTH411 or ANTH611.

ANTH612 Hypermarginality and Urban Health (3 Credits)
Using perspectives from medical and urban anthropology, we examine the phenomenon of hypermarginality--the clustering of extreme poverty, chronic disease, addiction, violence and trauma in certain social and spatial contexts, often urban. We will explore both the broader social, political, and economic structures of exclusion that produce hypermarginality, as well as the illness experiences associated with these conditions. As we consider both social suffering and the related institutional responses, we will also discuss the role of anthropological approaches in national discussions about health inequities.Also offered as: ANTH412.
Credit Only Granted for: ANTH412 or ANTH612.

ANTH613 Health Disparities in the United States (3 Credits)
Powerful economic, political, social, and cultural forces shape who gets sick, what illnesses/diseases they get, how they are treated while seeking care, what treatment options they have, and what their ultimate health outcomes are. The goal of the course is to understand these processes through the lens of critical medical anthropologyAlso offered as: ANTH413.
Credit Only Granted for: ANTH413, ANTH469Q, ANTH689Q, or ANTH613.
Formerly: ANTH689Q.

ANTH616 Anthropology of Global Violence (3 Credits)
An examination of anthropological approaches to the study of violence, drawing from key texts to analyze how violence operates along a continuum: from routine, sometimes invisible forms of violence embedded in everyday life, to more overt and exceptional forms. Consideration of the role of ethnography in elucidating both the subjective experiences of violence and the ways in which violence is embedded in institutions, structures, and global political-economic processes. Analysis of the specific relationships between violence, health, mental health, and trauma in local and global contexts.
Credit Only Granted for: ANTH416 or ANTH616.

ANTH617 Applied Urban Ethnography: Community Assessment Research (3 Credits)
Explores the use of ethnographic research methods in carrying out community assessment research to inform the design, implementation, and evaluation of culturally and community appropriate community-based initiatives. This course usually has a fieldwork component in a local urban neighborhood.Also offered as: ANTH491.
Credit Only Granted for: ANTH468B, ANTH617, or ANTH688B.

ANTH629 Advanced Developments in Biological Anthropology (3 Credits)
Graduate biological anthropology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Restriction: Permission of BSOS-Anthropology department.
Credit Only Granted for: ANTH429 or ANTH629.

ANTH630 Quantification and Statistics in Applied Anthropology (3 Credits)
An intensive overview of key quantitative and statistical approaches used by social scientists in applied ad policy research. This includes nonparametric and parametric statistical approaches. Students utilize statistical software and analyze existing and student-created databases. Anthropological case studies are emphasized.
Restriction: Must be in one of the following programs (Anthropology (Doctoral); Anthropology (Master's)).

ANTH640 Advanced Studies in Theory and Practice of Historical Archaeology (3 Credits)
Historical archaeology enhances cultural heritage by providing voice for groups who were often unable to record their own histories, such as women, laborers, working class families, and enslaved people. The course provides insight into issues related to race, gender, and ethnicity as they relate to multicultural histories.Also offered as: ANTH440.
Credit Only Granted for: ANTH440 or ANTH640.

ANTH641 Introduction to Zooarchaeology (3 Credits)
Zooarchaeology is the study of animal remains, especially bones, from archaeological contexts. This course will address both methodology as well as many of the main issues in contemporary zooarchaeology. Zooarchaeology stands at the intersection of a number of social and biological sciences, such as Biology, Osteology, Ecology, History, Anthropology and Economics. We will discuss basic animal osteology and the concepts and practices behind the identification of animal remains from archaeological contexts. We will cover the nature of the data in zooarchaeology, especially issues around using proxy data.Also offered as: ANTH341.
Credit Only Granted for: ANTH298D, ANTH341 or ANTH641.

ANTH643 Anthropological Approaches to Geographic Information Science (3 Credits)
A practical introduction to GIS program use, including the production of archaeological and other maps, profiles, and integrated presentations of plans, photographs, texts, an other digitally available materials, as well as research applications in applied biological and cultural anthropology.
Credit Only Granted for: ANTH448S, ANTH643, or ANTH689S.

ANTH647 Advanced Material Culture Studies in Archaeology (3 Credits)
An in-depth introduction to the world of material culture studies with a focus on the methods and theories in historical archaeology. Students will look at archaeological data as historical documents, commodities and as symbols expressing ideas.
Credit Only Granted for: ANTH447, ANTH448C, ANTH647, or ANTH689C.
Formerly: ANTH689C.

ANTH649 Advanced Developments in Archaeology (3 Credits)
Graduate Archaeology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Restriction: Permission of BSOS-Anthropology department.
Repeatable to: 6 credits if content differs.

ANTH650 Advanced Studies in Theory and Practice of Environmental Anthropology (3 Credits)
An overview of contemporary application of cultural theory and methods to environmental problems. Topics include the use of theories of culture, cognitive approaches, discourse analysis, and political ecology. Case studies from anthropology, other social sciences, humanities, conservation, and environmental history are used to demonstrate the applied value of a cultural-environmental approach.Also offered as: ANTH450.
Credit Only Granted for: ANTH450 or ANTH650.

ANTH651 Environmental Archaeology (3 Credits)
An overview of modern environmental archaeology as a tool for the interdisciplinary investigation of past and present global change and to engage the long term past with current issues of sustainability and rapid environmental change.
Credit Only Granted for: ANTH448F, ANTH451, ANTH688F, or ANTH651.
Formerly: ANTH688F.

ANTH652 Anthropology and Climate Change (3 Credits)
Human activities now influence ongoing global climatic change, and the outcome remains uncertain for communities and cultures around the world. This interaction between humans and climate provides a rich area of study for anthropologists in an interdisciplinary context. Case studies of historic and contemporary evidence will be used to understand impacts of global climate change and assess opportunities and barriers to successful responses and adaptation.Also offered as: ANTH452.
Credit Only Granted for: ANTH452 or ANTH652.

ANTH655 Introduction to Museum Scholarship (3 Credits)
Provides students a basic understanding of museums as cultural and intellectual institutions. Topics include the historical development of museums, museums as resources for scholarly study, and the museum exhibition as medium for presentation of scholarship.Also offered as: AMST655, HIST610.
Credit Only Granted for: ANTH655, AMST655, or HIST610.

ANTH664 Anthropology of Cultural Heritage (3 Credits)
A global exploration of how the past is remade in the present. Covers the breadth of scope and specific interventions of heritage practice at the global scale, including the social, political, economic, and ethical dimensions of cultural heritage.
Credit Only Granted for: ANTH469T, ANTH689T, ANTH464 or ANTH664.
Formerly: ANTH689T.

ANTH665 Method & Theory in Medical Anthropology and Global Health (3 Credits)
Provides a critical perspective to global health that encompasses key political, economic, and cultural factors associated with the nature and magnitude of global health issues such as HIV/AIDS, tuberculosis and malaria, paying particular attention to how poverty and inequalities within and between societies has accelerated current global health challenges. Introduces students to how medical anthropologists have contributed to the debates surrounding the globalization of health.
Credit Only Granted for: ANTH310, ANTH465 or ANTH665.

ANTH669 Advanced Developments in Cultural Anthropology (3 Credits)
Graduate cultural anthropology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Restriction: Permission of BSOS-Anthropology department.
Repeatable to: 6 credits if content differs.

ANTH670 Current Developments in Anthropological Theory (3 Credits)
A review of major contributions to anthropological theory, with a special emphasis on the relationship between practice and theory. Includes use of concept of culture in the four traditional subfields, fieldwork and grounded theory, and significant advances in general theory, symbolic anthropology, critical theory, and postmodernism.
Credit Only Granted for: ANTH470 or ANTH670.

ANTH672 Advanced Studies in Medical Anthropology (3 Credits)
An exploration of the cultural, social, economic and political dimensions of health, disease, and illness. These dimensions will be examined through both the health-seeker's and the care-provider's perspectives.
Credit Only Granted for: ANTH472, ANTH468L, ANTH672, or ANTH688L.
Formerly: ANTH688L.

ANTH688 Current Developments in Anthropology (3 Credits)
Detailed investigation of a current problem or research technique, the topic to be chosen in accordance with faculty interests and student needs.
Repeatable to: 9 credits if content differs.

ANTH689 Special Problems in Anthropology (1-6 Credits)

ANTH692 Anthropology of the Immigrant Life Course (4 Credits)
Explores social issues affecting local immigrant populations through readings, research and service learning. Theorizing immigration as a social policy issue in the U.S. culture, students learn about the specific contributions that anthropology has made to the understanding of immigration: globalization on the one hand, and the context of daily life in local neighborhoods on the other.Also offered as: ANTH492.
Credit Only Granted for: ANTH 492, ANTH692, ANTH498N, ANTH689N.
Formerly: ANTH689N.

ANTH696 Field Methods in Archaeology (6 Credits)
Field training in the techniques of archaeological survey and excavation.
Formerly: ANTH699.

ANTH698 Advanced Field Training in Ethnology (1-6 Credits)
Experience in field research utilizing a variety of enthnographic methods of inquiry.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: ANTH498 or ANTH698.

ANTH701 Anthropology Internship Preparation (3 Credits)
Preparation for internship includes practicum training in development, presentation and evaluation of position papers, proposals and work plans; literature search and use of secondary data sources in decision making the effect cultural analysis and resource management; ethics and professional development for work in non-academic settings.

ANTH712 Anthropology Internship Analysis (3 Credits)
The preparation and presentation of internship results, and the development of skills in report writing and presentation. Includes the completion of a professional quality report or publishable paper based on the internship experience.
Prerequisite: ANTH789.

ANTH722 Ecological Anthropology (3 Credits)
An overview of important approaches to ecological anthropology. Population, systems, community, political, behavioral and evolutionary ecology will be examined as they have been applied to a range of anthropological questions. Complexity theory (nonlinear dynamics) and topics in game theory will also be addressed. Students will map the field of ecological anthropology and to assess the strengths and weaknesses of contemporary approaches, methods and theories.
Restriction: Must be in one of the following programs (Anthropology (Doctoral); Anthropology (Master's)).
Credit Only Granted for: ANTH720 or ANTH722.

ANTH740 Theories of the Past and Accomplishments of Archaeology (3 Credits)
The primary purpose is to highlight some of the key achievements made by archaeologists in informing questions of interest to society from 1850 on. Key achievements include how archaeologists understand elements of the past thought to be central to the development of modern socieity. A secondary purpose is to introduce students to the theories used to understand the place of the past in society and the function of answers to questions thought central to modern social life.
Credit Only Granted for: ANTH689P or ANTH740.
Formerly: ANTH689P.

ANTH741 Introduction to Cultural and Heritage Resource Management (3 Credits)
An introduction to the field of cultural and heritage resource management. Examines existing international, national, and local frameworks for the protection of cultural heritage. Provides an overview of employment opportunities and ethical responsibilities within the profession.
Restriction: Must be in the Cultural and Heritage Resource Management Program (CHRM); or by permission of the Anthropology department.

ANTH742 Vital Technologies: Methods, Applications, and Interpretation (3 Credits)
An examination of the range of nondestructive technologies used to research and image cultural and heritage resources. Standard archaeological survey methods will be covered and will focus on remote sensing technologies and how an integrated approach to archaeological investigation can reveal vital information for resource planning, interpretation, and outreach.
Restriction: Must be in the Cultural and Heritage Resource Management Program (CHRM); or by permission of the Anthropology department.

ANTH743 Community Engagement and Consultation (3 Credits)
A grounding in cultural communication and sensitivity to community, cultural, and stakeholder needs within and beyond project specific confines. Using the broader context of practicing anthropology in the exploration of communication styles, learning styles, and cultural biases and taboos, students are exposed to underlying concepts concerning inter-cultural communication so that they may develop more collaborative approaches to research. The program also provides background in the development of public outreach programs in the context of cultural and heritage resource management.
Restriction: Must be in the Cultural and Heritage Resource Management Program (CHRM); or by permission of the Anthropology department.

ANTH744 Collections, Data Management and Cultural Materials Preservation (3 Credits)
An overview of the process of collecting cultural materials and samples with the goal of obtaining as much information during analysis as possible followed by content relating to archaeological curation and collections management. Provides information on the preservation of cultural materials from the time they leave the field until they are placed in a certified collections facility.
Restriction: Must be in the Cultural and Heritage Resource Management Program (CHRM); or by permission of the Anthropology department.

ANTH760 Development of Social/Cultural Theory (3 Credits)
A broad perspective of the history of social cultural theory in anthropology and the critical skills needed for understanding the subdiscipline is provided. An overview of the history of theorizing about society and culture will help outline the past, present, and future of anthropology and its relations with other scientific and humanistic disciplines.

ANTH788 Internship Research (1-3 Credits)
This course augments ANTH 789 and is graded in conjunction with it.
Prerequisite: ANTH701.
Restriction: Permission of BSOS-Anthropology department; and must be in one of the following programs (Anthropology (Master's); Anthropology (Doctoral)).

ANTH789 Internship (3-6 Credits)
Individual instruction course supervised by a department faculty member.
Prerequisite: ANTH701.
Repeatable to: 6 credits if content differs.
Formerly: ANTH705.

ANTH856 Museum Research Seminar (3 Credits)
A research seminar focusing on the practice and presentation of cultural and historical scholarship in museums and historical sites. Students will complete an original research project on the challenges and opportunities of public exhibition and interpretation of cultural and historical research.
Prerequisite: HIST610. Also offered as: HIST810, AMST856.
Credit Only Granted for: ANTH856, AMST856, or HIST810.

ANTH857 Museum Scholarship Practicum (3-6 Credits)
Students devise and carry out a research program using the collections at the Smithsonian Institution or some other cooperating museum, working under joint supervision of a museum professional and a university faculty member.
Prerequisite: HIST810.
Restriction: Permission of Museum Scholarship Program required. Also offered as: HIST811, AMST857.
Credit Only Granted for: ANTH857, AMST857, or HIST811.

ANTH898 Pre-Candidacy Research (1-8 Credits)

ANTH899 Doctoral Dissertation Research (1-6 Credits)

AOSC - Atmospheric and Oceanic Science

AOSC400 Physical Meteorology of the Atmosphere (3 Credits)
The application of basic classical physics, chemistry and mathematics t the study of the atmosphere. Composition of the atmosphere; energy sources and sinks (radiation in the atmosphere; radiative balance and radiative forcing of atmospheric processes); atmospheric thermodynamics; clouds and precipitation physics; atmospheric electricity and optics; mesoscale processes (e.g., orographic mesoscale phenomena and instabilities); air mass boundaries; severe weather, tropical cyclones; storms; global circulation.
Prerequisite: 1 course with a minimum grade of C- from (PHYS171, PHYS161, MATH141); or permission of CMNS-Atmospheric & Oceanic Science department.
Formerly: METO400.

AOSC401 Climate Dynamics and Earth System Science (3 Credits)
Introduction of the earth and global climate systems and their major components: atmosphere, land, ocean, biosphere and cryosphere. Key processes governing the function of the earth's climate: Global energy balance and water cycle, climate dynamics (general circulation of the atmosphere and ocean) and climate physics (aerosol, cloud and rain), as well as climate variability and climate changes. Phenomena resulting from this coupled system including El Nino-Southern Oscillation, monsoons, and the hydrological cycle will be discussed, with a focus on how the Earth System responds to global warming.
Prerequisite: AOSC400 or AOSC200; and MATH141; and (PHYS161 or PHYS171). Or permission of instructor.

AOSC420 Physical Oceanography (3 Credits)
Ocean observations. Water masses, sources of deep, intermediate, and surface water. Mass, heat, and salt transport, and the meridional overturning circulation. Geochemical tracers and cycles, including carbon. Western boundary currents, mixed layers, and processes maintaining the thermocline. Coastal and estuarine processes. Surface waves and tides. the ocean's role in climate.
Prerequisite: MATH141 and PHYS141.
Recommended: AOSC200. Also offered as: AOSC670, GEOL670.
Credit Only Granted for: AOSC420, AOSC670, or GEOL670.

AOSC424 Remote Sensing of the Atmosphere and Ocean (3 Credits)
Many of the properties of the atmosphere, ocean, and land surface are most easily observed from satellite remote sensing. This course will provide students with a hands-on introduction to a variety of passive and active sensing techniques and sensors observing our changing environment. Topics include: orbital dynamics and electromagnetic properties of the atmosphere and surface; atmospheric emission characteristics and scattering; chemical composition and spectroscopy; temperature retrievals; detection and retrieval of aerosol, cloud and rain; ocean surface properties; sea surface temperature and color; active sensing of wind stress, sea level, and internal waves; time-dependent gravity; properties of vegetation and ice.
Prerequisite: 1 course with a minimum grade of C- from (PHYS171, PHYS161, MATH141); or permission of instructor.

AOSC431 Atmospheric Thermodynamics (3 Credits)
Classical thermodynamics applied to both the dry and the moist atmosphere. Composition; phase changes of water; stability concepts; Properties of aerosols and clouds, cloud nucleation and precipitation processes, atmospheric electricity, cloud and precipitation chemistry.
Prerequisite: 1 course with a minimum grade of C- from (PHYS171, PHYS161, MATH141).
Recommended: MATH246.
Credit Only Granted for: AOSC431 or METO431.
Formerly: METO431.

AOSC432 Dynamics of the Atmosphere and Ocean (3 Credits)
Equations of motion and their approximation, scale analysis for the atmosphere and the ocean. Conservation properties. Fluid motion in the atmosphere and oceans. Geostrophic/balanced and ageostrphic/unbalanced motion. Circulation, vorticity, and potential vorticity. Introduction to the boundary layer.
Prerequisite: AOSC431.
Corequisite: MATH246.
Credit Only Granted for: AOSC432, METO432, or AOSC632.
Formerly: METO432.

AOSC434 Air Pollution (3 Credits)
Production, transformation, transport and removal of air pollutants. The problems of photochemical smog, the greenhouse effect, stratospheric ozone, acid rain and visibility. Analytical techniques for gases and particles.
Prerequisite: MATH241; or permission of CMNS-Atmospheric & Oceanic Science department.
Formerly: METO434.

AOSC436 Principles of Biogeochemistry (3 Credits)
An introduction to the basic principles of biogeochemistry including aspects of organic geochemistry, biochemistry, microbiology, global geochemical cycles, the origin of life and paleoenvironmental evolution.
Prerequisite: MATH120 or MATH140; or must have completed MATH220. And (GEOL100 or GEOL120); and GEOL322. And CHEM131 and CHEM132; or (CHEM135 and CHEM136).
Restriction: Non-degree-seeking students require the permission of the instructor. Also offered as: GEOL436.
Credit Only Granted for: GEOL436 or AOSC436.

AOSC437 Global Climate Change: Past and Present (3 Credits)
A highlight to the fact that global climate change is part of the Earth's past as well as of its present and future. Changes in climate that have occurred in the geologic past can be viewed as the Earth's natural climate variability. These changes are different from, though could be linked with, historical and present anthropogenically-induced climate change. We will discuss the modern climate system, the factors capable of forcing climate change on various time scales, the geologic proxies of past climate change and what these proxies tell us. Finally, we will compare and contrast past climate change with what is understood (and not understood) about modern climate change.
Prerequisite: MATH115 or MATH140; and (GEOL100 or GEOL120); and (CHEM131 or CHEM135); and (CHEM132 or CHEM136).
Restriction: Non-degree seeking students require permission of the instructor. Also offered as: GEOL437.

AOSC458 Advanced Topics in Atmospheric and Oceanic Science (1-4 Credits)
Special topics in atmospheric and oceanic science are given intensive study. The topic of concentration varies, from semester to semester and depends on student and faculty interests. Often, specialists from other institutions are invited to the campus on a visiting lectureship basis to conduct the course.
Repeatable to: 12 credits.

AOSC470 Synoptic Meteorology (3 Credits)
Atmospheric properties and observations, meteorological analysis and charts, operational numerical forecasts. Application of quasigeostrophic theory, baroclinic instability, midlatitiude and mesoscale weather systems. Tropical meteorology. Weather forecasting using numerical and statistical models. Prediction of weather phenomena on the global, syoptic, meso, and local scales. Analysis of surface and upper air data; Norwegian cyclone model; introduction to weather forecasting.
Prerequisite: Minimum grade of C- in AOSC431 and AOSC432.
Credit Only Granted for: AOSC470, AOSC600, or METO600.

AOSC472 Mesoscale Meteorology (3 Credits)
Survey a broad range of mesoscale meteorological features with emphasis on convection and associated phenomena. Define the mesoscale and understand its underlying principles; Introduce non-convective circulations and their importance for weather forecasting; Understand the precursors and occurrence of deep moist convection.
Prerequisite: AOSC432, AOSC600, AOSC610, or AOSC470.
Restriction: Non-degree-seeking students require the permission of the instructor. Also offered as: AOSC602.
Credit Only Granted for: AOSC472 or AOSC602.

AOSC475 Carbon Cycle and Climate: Past, Present, and Future (3 Credits)
The fundamentals of the Earth's carbon cycle, a key biogeochemical cycl that controls Earth's climate and life. The changing characteristics of the carbon cycle on several timescales, ranging from geological, interannual, and the more recent anthropogenic influences on carbon cycle and climate. The carbon cycle in the atmosphere, land, ocean, and the biosphere. The underlying human activities such as fossil fuel burning and deforestation that are responsible for the increase in the atmosphere CO2 and our future options in dealing with the carbon problem such as alternative energy and carbon sequestration.Also offered as: AOSC675.
Credit Only Granted for: AOSC475 or AOSC675.

AOSC484 Climate System Modeling (3 Credits)
Fundamentals in building computer models to simulate the components of the climate system: atmosphere, ocean ice, land-surface, terrestrial and marine ecosystems, and the biogeochemical cycles embedded in the physical climate system, in particular, the carbon cycle. Simple to state-of-the-art research models to tackle problems such as the Daisy World, El Nino and global warming.Also offered as: AOSC684.
Credit Only Granted for: AOSC484 or AOSC684.

AOSC493 Senior Research Project I (3 Credits)
Technical writing and oral presentation skills. Planning, writing, and presenting a plan for research in the geosciences.
Prerequisite: Permission of CMNS-Atmospheric & Oceanic Science department.
Restriction: Must be in Atmospheric and Oceanic Science program. Or must not be in Atmospheric and Oceanic Science program; and permission of instructor.

AOSC494 Atmospheric and Oceanic Science Seminar (1 Credit)
Exposure to a wide range of contemporary topics in atmospheric, oceanic, and climate sciences, to foster research interests and promote critical thinking through the weekly AOSC departmental seminar series.
Prerequisite: Minimum grade of C- in AOSC431 and AOSC432.

AOSC498 Senior Research Project II (3 Credits)
The project will be based on the research or development plan created in AOSC493. It may be completed with the approval of a faculty advisor in conjunction with an internship. Final written thesis and oral defense will be expected.
Prerequisite: AOSC493.

AOSC499 Special Problems in Atmospheric Science (1-3 Credits)
Research or special study in the field of meteorology and the atmospheric and oceanic sciences.
Prerequisite: Permission of CMNS-Atmospheric & Oceanic Science department.
Repeatable to: 6 credits.
Formerly: METO499.

AOSC600 Synoptic Meteorology I (3 Credits)
Atmospheric properties and observations, meteorological analysis and charts, operational numerical forecasts. Application of quasigeostrophic theory, baroclinic instability, midlatitude and mesoscale weather systems. Tropical meteorology.
Prerequisite: AOSC610.
Credit Only Granted for: AOSC470 or AOSC600.
Formerly: METO600.

AOSC602 Mesoscale Meteorology (3 Credits)
Survey a broad range of mesoscale meteorological features with emphasis on convection and associated phenomena. Define the mesoscale and understand its underlying principles; Introduce non-convective circulations and their importance for weather forecasting; Understand the precursors and occurrence of deep moist convection.

AOSC610 Dynamics of the Atmosphere and Ocean I (3 Credits)
Equations of motion and their approximation, scale analysis for the atmosphere and the ocean. Conservation properties. Fluid motion in the atmosphere and oceans. Circulation and vorticity, geostrophic motion and the gradient wind balance. Turbulence and Ekman Layers.
Prerequisite: Must have completed or be concurrently enrolled in MATH462; or students who have taken courses with comparable content may contact the department.
Formerly: METO610.

AOSC611 Dynamics of the Atmosphere and Oceans II (3 Credits)
Waves and instabilities in the atmosphere and the ocean. Gravity, Rossby, coastal and equatorial waves. Flow over topography. Dynamic instabilities including barotropic, baroclinic, inertial, and instabilities of the coupled ocean-atmosphere system. Stationary waves and multiple equilibria.
Formerly: METO611.

AOSC614 Atmospheric Modeling, Data Assimilation and Predictability (3 Credits)
Solid foundation for atmospheric and oceanic modeling and numerical weather prediction: numerical methods for partial differential equations, an introduction to physical parameterizations, modern data assimilation, and predictability.
Prerequisite: AOSC610; or permission of instructor.

AOSC615 Advanced Methods in Data Assimilation for the Earth Sciences (3 Credits)
An overview of the most important methods of data assimilation. Theory, techniques and strategies of these methods, as well as their possible drawbacks. Hands-on experimentation with variational and other data assimilation systems.
Prerequisite: AOSC614; or permission of instructor.

AOSC617 Atmospheric and Oceanic Climate (3 Credits)
The general circulation of the atmosphere and oceans, historical perspective, observations, and conceptual models; wind-driven and thermohaline circulation of the oceans. Seasonal cycle and monsoon circulations; interannual to interdecadal climate variability; climate change.
Prerequisite: AOSC610; or permission of instructor.
Formerly: METO617.

AOSC620 Physics and Chemistry of the Atmosphere I (3 Credits)
Air parcel thermodynamics and stability; constituent thermodynamics and chemical kinetics. Cloud and aerosol physics and precipitation processes.
Prerequisite: MATH461; or students who have taken courses with comparable content may contact the department.
Formerly: METO620.

AOSC621 Physics and Chemistry of the Atmosphere II (3 Credits)
Spectroscopy; basic concepts in radiative transfer and atmospheric chemistry; photolysis rates for atmospheric molecules.
Prerequisite: MATH462; or students who have taken courses with comparable content may contact the department.
Formerly: METO621.

AOSC624 Remote Sensing of Surface Climate (3 Credits)
The theory and principles of remote sensing as applicable to earth observing satellites. Discussed will be current methods to interpret satellite observations into useful climate parameters. Emphasis will be placed on parameters that provide information about the climate close to the earth surface, and that can be inferred on regional to global scales. Examples are: surface temperature and reflectivity, radiation budgets, soil moisture, and vegetation cover.
Prerequisite: MATH240 and MATH241.

AOSC625 Remote Inference of Atmospheric Properties by Satellite (3 Credits)
Fundamentals of radiative transfer concepts, theories and models pertinent to remote sensing. Satellite platforms, sensors and systems used for operation and research in atmospheric remote sensing. Concepts and technologies of passive and active remote sensing. Remote sensing methods and products of atmospheric constituents, aerosol, cloud, precipitation, temperature and water vapor profiles, precipitation in liquid and ice forms, radiation budget, and remote sensing application in data assimilation for numerical weather forecast (NWP); use of atmospheric remote sensing products for development of global climate model (GCM).
Prerequisite: AOSC621. And MATH461; or students who have taken courses with comparable content may contact the department.
Recommended: Non-degree-seeking students require permission of the instructor.
Formerly: METO625.

AOSC630 Statistical Methods in Meteorology and Oceanography (3 Credits)
Parametric and non-parametric tests; time series analysis and filtering; wavelets. Multiple regression and screening; neural networks. Empirical orthogonal functions and teleconnections. Statistical weather and climate prediction, including MOS, constructed analogs. Ensemble forecasting and verification.
Prerequisite: STAT400; or students who have taken courses with comparable content may contact the department.
Formerly: METO630.

AOSC632 Atmsopheric Dynamics (3 Credits)
The equations of motion of the atmosphere are developed, and then analyzed with a focus on developing students' intuition about the behavior of the large-scale atmospheric flow in the mid-latitudes. Topics covered: Kinematics; forces in the atmosphere; apparent forces arising from the rotation of the earth; vertical coordinate systems; spherical coordinate; natural coordinates; hydrostatic, cyclostrophic; geostrophic and gradient wind balances; diagnosis of vertical motion (the omega equation); prediction of surface pressure; dynamics of fronts; lifecycle of baroclinic distrubances; introduction to climate sensitivity and climate feedbacks.
Prerequisite: AOSC431.
Corequisite: MATH246.
Restriction: Must not have completed AOSC432.
Credit Only Granted for: AOSC432 or AOSC632.

AOSC633 Atmospheric Chemistry and Climate (3 Credits)
The effects of human activity on atmospheric composition, focused on global warming, the carbon cycle, air pollution, and the ozone layer. Fundamentals of atmosphereic chemistry (spectroscopy, kinetics, isotopic analysis, and biogeochemical cycles) are related to the modern understanding of climate change, air quality, and ozone depletion, based on resources such as satellite missions, field campaigns, and scientific assessments published by international agencies. We also examine how society's energy needs could be met, in the future, in a manner with less impact on atmospheric composition than the present heavy reliance on combusion of fossil fuels.
Prerequisite: CHEM131, CHEM135, or CHEM146. And MATH241; or permission of CMNS-Atmospheric & Oceanic Science department. Also offered as: CHEM633.
Credit Only Granted for: AOSC433, AOSC633, CHEM433, or CHEM633.
Formerly: AOSC658R.

AOSC634 Air Sampling and Analysis (3 Credits)
Theory and application of analytical techniques for the analysis of atmospheric gases and particles including priority pollutants. Combined chemical and meteorological considerations in designing field experiments.
Formerly: METO634.

AOSC637 Atmospheric Chemistry (3 Credits)
Application of the techniques of thermodynamics, kinetics, spectroscopy and photochemistry to atmospheric gases and particles. Investigation of the global cycles of C, H, O, N, and S species; the use of laboratory and field measurements in computer models of the atmosphere.
Prerequisite: CHEM481.
Formerly: METO637.

AOSC652 Analysis Methods in Atmospheric and Oceanic Science (3 Credits)
A variety of the analysis methods used by atmospheric and oceanic scientists will be applied to observational data sets such as Vostok ice core record, temperature trends, and satellite measurements of ozone,sea ice, etc. in a hands-on, computer laboratory setting. Students will be exposed to Fortran and Python as well as modern file formats such as HDF and netCDF. No prior programming experience required.
Prerequisite: PHYS141 and MATH241; or students who have taken courses with comparable content may contact the department.
Recommended: AMSC460, CMSC660, AMSC660, or CMSC460.

AOSC658 Special Topics in Meteorology (1-3 Credits)
Various special topics in meteorology are given intensive study. The topic of concentration varies, from semester to semester and depends on student and faculty interests. Often, specialists from other institutions are invited to the campus on a visiting lectureship basis to conduct the course.
Restriction: Permission of instructor.
Formerly: METO658.

AOSC661 Sustainability Modeling (3 Credits)
Suitable for students who are concerned with sustainability issues, have little or no background in computational modeling, but would like to understand what modeling can do to help solve sustainability problems. By exploring a variety of contemporary societal issues (e.g., water scarcity, biodiversity loss, energy dependence), you will be introduced to modeling approaches for simulating and quantitatively understanding sustainability variables (inputs and outputs), and using modeling towards the design of policy measures that can be implemented as a response to such issues.

AOSC662 Ecohydrology (3 Credits)
The vulnerability and resilience of ecosystems are dependent on phenomena that link the cycling of water, nutrients and other biogeochemically active elements. Understanding the perturbations in these cycles that trigger impacts on ecosystem spatiotemporal characteristics is a challenge that generally transcends disciplinary and geographical boundaries, and is key to sustaining the diversity of life on Earth. This course on ecohydrology focuses on the study of hydrologically-controlled ecosystems, e.g. systems in which either excess and/or deficit of water and nutrients are determinants of its structure and function. Such systems have complex dynamic characteristics that depend on many interrelated links between climate, soil and vegetation.
Prerequisite: AOSC610; and undergraduate level hydrology and/or hydrogeology, familiarity with differential calculus and equations. Please consult with instructor for details.

AOSC663 Water and Climate Systems (3 Credits)
Focuses on exploring options for adaptation and building resilience to the possible impacts of climate change through an interwoven understanding of the physical, biological, social, cultural, economic and institutional constraints of water resources issues and consideration of climate-related risks in the management and decision-making process.
Prerequisite: AOSC610; and undergraduate level hydrology and/or hydrogeology, familiarity with differential calculus and equations. Please consult with instructor for details.

AOSC670 Physical Oceanography (3 Credits)
Ocean observations. Water masses, sources of deep water. Mass, heat, and salt transport, geochemical tracers. Western boundary currents, maintenance of the thermocline. Coastal and estuarine processes. Surface waves and tides. Ocean climate.
Prerequisite: Permission of CMNS-Atmospheric & Oceanic Science department. Also offered as: AOSC420, GEOL670.
Credit Only Granted for: GEOL670, AOSC670 or AOSC420.

AOSC675 Carbon Cycle and Climate: Past, Present, and Future (3 Credits)
The fundamentals of the Earth's carbon cycle, a key biogeochemical cycle that controls Earth's climate and life. The changing characteristics of the carbon cycle on several timescales, ranging from geological, interannual, and the more recent anthropogenic influences on carbon cycle and climate. The carbon cycle in the atmosphere, land, ocean, and the biosphere. The underlying human activities such as fossil fuel burning and deforestation that are responsible for the increase in the atmosphere CO2 and our future options in dealing with the carbon problem such as alternative energy and carbon sequestration.Also offered as: AOSC475.
Credit Only Granted for: AOSC475 or AOSC675.

AOSC680 Introduction to Earth System Science (3 Credits)
An introduction to the study of the earth as a system: atmosphere, oceans, land, cryosphere, solid earth, and humans. Cycling of materials and energy in the earth system: the energy cycle, the hydrologic cycle, the carbon cycle, the nitrogen cycle. Climate processes and variability: land-atmosphere, ocean-atmosphere, biosphere-climate, and human interactions, short- and long-term variability in climate.

AOSC684 Climate System Modeling (3 Credits)
Fundamentals in building computer models to simulate the components of the climate system: atmosphere, ocean ice, land-surface, terrestrial and marine ecosystems, and the biogeochemical cycles embedded in the physical climate system, in particular, the carbon cycle. Simple to state-of-the-art research models to tackle problems such as the Daisy World, El Nino and global warming.Also offered as: AOSC484.
Credit Only Granted for: AOSC484 or AOSC684.

AOSC798 Directed Graduate Research (1-3 Credits)

AOSC818 Frontiers in Atmosphere, Ocean, Climate, and Synoptic Meteorology Research (1 Credit)
A broad range of topics in the contemporary sciences of atmosphere, ocean, climate and synoptic meteorology are covered.
Repeatable to: 18 credits if content differs.

AOSC898 Pre-Candidacy Research (1-8 Credits)

AOSC899 Doctoral Dissertation Research (1-8 Credits)

ARAB - Arabic

ARAB401 Readings in Arabic Literature (3 Credits)
A survey of Modern Arabic literature is given through a range of selected texts. Texts are studied as literature with constant reference to the social, cultural and political contexts in which they were written. Taught in Arabic.
Prerequisite: ARAB305; or permission of ARHU-School of Languages, Literatures, and Cultures department.
Restriction: Must not be a fluent/native speaker of Arabic.

ARAB402 Arabic English Translation (3 Credits)
In-depth practicum in translation from Arabic to English. Exploration of the complexities of translation as an exercise of textual interpretation and linguistic transformation.
Prerequisite: ARAB305; or permission of ARHU-School of Languages, Literatures, and Cultures department.
Restriction: Must not be a fluent/native speaker of Arabic.

ARAB489 Special Topics in Arabic Studies (3 Credits)
In-depth study of particular aspect of Arabic language and culture. Specific topics to be announced when course is offered. Taught in Arabic.
Prerequisite: ARAB305; or permission of ARHU-School of Languages, Literatures, and Cultures department.

ARAB499 Special Topics in Arabic Studies (3 Credits)
In-depth study of particular aspect of Arabic culture, literature and language. Specific topic to be announced when course is offered.
Repeatable to: 6 credits if content differs.

ARAB628 Special Topics in Arabic Studies (3 Credits)
In-depth study of a particular aspect of Arabic Studies. Topics to be announced when course if offered. Taught in Arabic.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

ARAB638 Special Topics in Middle Eastern Studies (3 Credits)
In-depth study of a particular aspect of Middle Eastern Studies. Topic to be announced when course is offered. Taught in Arabic.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

ARAB788 Internship in Arabic (3-6 Credits)
Field and/or professional experience in a public or private institution where Arabic is the language of work.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

ARAB789 Independent Study in Arabic (1-3 Credits)
Independent study in Arabic. Taught in Arabic.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 9 credits if content differs.

ARCH - Architecture

ARCH400 Architecture Design Studio I (6 Credits)
Introduction to architectural design with particular emphasis on conventions and principles of architecture, visual and verbal communication skills, formal analysis, design process, spatial composition, architectural promenade, basic program distribution, and elementary constructional and environmental responses.
Restriction: Must be in a major in ARCH-Architecture Program; and permission of ARCH-Architecture Program.

ARCH401 Architecture Design Studio II (6 Credits)
Continuation of ARCH 400 with introduction to building typology, urban and contextual issues, design of the vertical surface, and architectural interiors.
Prerequisite: Minimum grade of C- in ARCH400.
Restriction: Must be in Architecture (B.S.) program.

ARCH402 Architecture Design Studio III (6 Credits)
Architectural design studio with emphasis on building and facade typologies, the development of architectural promenade and sequence, public and/or civic infill buildings dependent upon the architectural promenade, and urban housing types of varying densities. The architect's obligations to urban context are explored in many dimensions including historical, typological, and physical.
Prerequisite: Minimum grade of C- in ARCH401.
Restriction: Must be in Architecture (B.S.) program.

ARCH403 Architecture Design Studio IV (6 Credits)
Investigations into the relationship between the man-made and the natural world including introductory issues of assembly and material value. Design of the site and the building are combined into an integral process delimiting and probing the boundaries of each and exploring their reciprocal relationship. The architect's obligations to the natural and urban contexts are explored in many dimensions including historical, typological, environmental, and physical.
Prerequisite: Minimum grade of C- in ARCH402.
Restriction: Must be in Architecture (B.S.) program.

ARCH404 Graduate Architecture Design Studio I (6 Credits)
Introduction to architectural design with particular emphasis on conventions and principles of architecture , visual and verbal communication skills, formal analysis, design process, spatial composition, architectural promenade, basic program distribution, and elementary constructional and environmental responses. Offered fall only.
Recommended: For 3 1/2 year graduate students only.
Restriction: Must be in Architecture (Master's) program.

ARCH405 Graduate Architecture Design Studio II (6 Credits)
Architectural design studio with emphasis on building and facade typologies, the development of architectural promenade and sequence, public and/or civic infill buildings dependent upon the architectural promenade, and urban housing types of varying densities. The architect's obligations to urban context are explored in many dimensions including historical, typological, and physical. Offered spring only.
Prerequisite: Minimum grade of C- in ARCH404.
Restriction: Must be in Architecture (Master's) program.

ARCH406 Graduate Architecture Design Studio III (6 Credits)
Investigations into the relationship between the man-made and the natural world including introductory issues of assembly and material value. Design of the site and the building are combined into an integral process delimiting and probing the boundaries of each and exploring their reciprocal relationship. The architect's obligations to the natural and urban contexts are explored in many dimensions including historical, typological, environmental, and physical.
Prerequisite: Minimum grade of C- in ARCH405.
Restriction: Must be in Architecture (Master's) program.

ARCH407 Graduate Architecture Design IV (6 Credits)
Studio problems and theories concentrating on urbanism and urban design techniques. Issues and sites range from high-density urban in-fill to suburban and greenfield development in American and other contexts. Studio theories explore such topics as Contextualism, Neo-Traditional design, Transit Oriented Development, density, sustainable development, building typology, and street design.
Prerequisite: Minimum grade of C- in ARCH406.
Restriction: Must be in Architecture (Master's) program.

ARCH408 Special Topics Architecture Design Studio (6 Credits)
Design Studio course to examine topical problems in architecture and urban design.
Restriction: Must be in a major in ARCH-Architecture Program; and permission of ARCH-Architecture Program.
Repeatable to: 12 credits if content differs.
Additional Information: Elective Architecture Design Studio that may be taken for repeat or advanced credit for arch400 arch401 arch402 arch403 and/or an additional design studio.

ARCH410 Architecture Technology I (4 Credits)
First course in a four course sequence which develops the knowledge and skills of architectural technology. Addresses climate, human responses to climate, available materials, topography and impact on culture. Principles of assembly, basic structural principles and philosophies of construction.
Prerequisite: MATH120 or MATH140; or must have completed MATH220. And PHYS121; and (GEOG140, GEOG123, GEOL120, AOSC123, GEOL123, or BSCI205).
Corequisite: ARCH400.
Restriction: Must be in Architecture (B.S.) program.

ARCH411 Technology II (4 Credits)
Second course in a four course sequence. Building construction processes and terminology; use and performance characteristics of primary building materials; principles of structural behavior related to the building systems; equilibrium and stability, stiffness and strength, types of stress, distribution of force and stress, resolution of forces, reactions, bending moments, shear, deflection, buckling.
Prerequisite: ARCH410.
Corequisite: ARCH401.
Restriction: Must be in Architecture (B.S.) program.

ARCH412 Architecture Technology III (4 Credits)
Third course in a four course sequence. Design of steel, timber, and reinforced concrete elements and subsystems; analysis of architectural building systems. Introduction to design for both natural and man-made hazards.
Prerequisite: Minimum grade of C- in ARCH411.
Corequisite: ARCH402.
Restriction: Must be in Architecture (B.S.) program.

ARCH413 Architecture Technology IV (4 Credits)
Final course in a four course sequence. Theory, quantification, and architectural design applications for HVAC, water systems, fire protection electrical systems, illumination, signal equipment, and transportation systems.
Prerequisite: ARCH412.
Corequisite: ARCH403.
Restriction: Must be in Architecture (B.S.) program.

ARCH418 Selected Topics in Architectural Technology (3 Credits)
Selected Topics in Architectural Technology
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH419 Independent Studies in Architectural Technology (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH420 History of American Architecture (3 Credits)
American architecture from the late 17th to the 21st century.
Prerequisite: ARCH221; or permission of ARCH-Architecture Program.

ARCH422 History of Greek Architecture (3 Credits)
Survey of Greek architecture from 750-100 B.C.
Prerequisite: ARCH221; or permission of ARCH-Architecture Program.

ARCH423 History of Roman Architecture (3 Credits)
Survey of Roman architecture from 500 B.C. To A.D. 325.
Prerequisite: Permission of ARCH-Architecture Program.

ARCH425 History of Architecture I (3 Credits)
Pre-1500 World Architecture survey course - History of Architecture structured to develop critical thinking and visually literacy with regard to the worldwide legacy of design thinking and cultural production through architecture. Structured to nurture critical thinking and visually literacy with regard to the worldwide legacy of architecture. The work in the course will involve the evaluation of sources and arguments in reading architectural history. Architecture will be framed relative to ways of thinking, religious beliefs, cultural heritage, and cultural values.
Restriction: Permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH225 or ARCH425.
Additional Information: Graduate architecture history course requires additional recitation section and additional coursework tied to survey lectures.

ARCH426 History of Architecture II (3 Credits)
Post-1500 - History of Architecture survey course - History of Architecture structured to develop critical thinking and visually literacy with regard to the worldwide legacy of design thinking and building innovation in architecture. Structured to nurture critical thinking and visually literacy with regard to the worldwide legacy of architecture. The work in the course will involve the evaluation of sources and arguments in reading architectural history. Architecture will be framed relative to ways of thinking, religious beliefs, cultural heritage, and cultural values.
Restriction: Permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH226 or ARCH426.
Additional Information: Graduate architecture history course requires additional recitation section and additional coursework tied to survey lectures.

ARCH427 Theories of Architecture (3 Credits)
Survey of architectural theories - theories of architectural design, representation and urban design from antiquity to the present day.
Prerequisite: ARCH426; or permission of ARCH-Architecture Program.
Restriction: Must be in Architecture (B.S.) program.

ARCH428 Selected Topics in Architectural History (1-4 Credits)
Selected Topics in Architectural History
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH429 Independent Studies in Architectural History (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH430 Measuring Sustainability in Architecture (3 Credits)
Studies metrics of sustainability as included in rating standards, including LEED. All students will take the LEED GA test.
Credit Only Granted for: ARCH430 or ARCH418M.
Formerly: ARCH418M.

ARCH433 History of Renaissance Architecture (3 Credits)
Renaissance architectural principles and trends in the 15th and 16th centuries and their modifications in the Baroque period.
Prerequisite: ARCH221; or permission of ARCH-Architecture Program.

ARCH434 History of Modern Architecture (3 Credits)
Architectural trends and principles from 1750 to the present, with emphasis on developments since the mid-19th century.
Prerequisite: ARCH221; or permission of ARCH-Architecture Program.

ARCH435 History of Contemporary Architecture (3 Credits)
Architectural history from World War II to the present.
Prerequisite: ARCH221; or permission of ARCH-Architecture Program.

ARCH443 Visual Communication For Architects (3 Credits)
Investigation of the relationship between drawing from life and architectural drawing, the conventions of architectural drawing and the role of architectural drawing as a means to develop, communicate, and generate architectural ideas.
Corequisite: ARCH400.
Restriction: Must be in Architecture (Master's) program; and must be in the 3.5 year M. ARCH program.

ARCH445 Visual Analysis of Architecture (3 Credits)
Study of visual principles of architectural and urban precedents through graphic analysis. Exercises include on-site observation, documentation and analysis. Focuses on the development of an architect's sketchbook as a tool for life-long learning.
Prerequisite: ARCH400; or permission of ARCH-Architecture Program.
Restriction: Must be in Architecture (B.S.) program.

ARCH448 Selected Topics in Visual Studies in Architecture (3 Credits)
Selected Topics in Visual Studies in Architecture
Restriction: Permission of ARCH-Architecture Program; and must be in a major in ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH449 Independent Studies in Visual Studies in Architecture (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program; and must be in a major in ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH456 Great Cities (3 Credits)
Case studies from a selection of the great cities of the world.
Prerequisite: Permission of ARCH-Architecture Program.

ARCH458 Selected Topics in Urban Design (3 Credits)
Selected Topics in Urban Design
Restriction: Must be in a major in ARCH-Architecture Program; and permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH459 Independent Studies in Urban Design (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Must be in a major in ARCH-Architecture Program; and permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH460 Site Analysis and Design (3 Credits)
Principles and methods of site analysis; the influence of natural and man-made site factors on site design and architectural form.
Restriction: Permission of ARCH-Architecture Program.

ARCH461 Sustainability in Architecture (3 Credits)
Strategies of sustainability as related to the broader context of architectural problem solving.
Restriction: Permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH418S or ARCH461.
Formerly: ARCH418S.

ARCH462 Methods & Materials of Building Construction (3 Credits)
Building Construction methods and materials are examined through case studies to explore the means and techniques applied to the material execution of buildings and BIM. Focus on an understanding of the organization of the design and construction process and awareness of building and zoning codes, material systems and types.
Restriction: Must be in a major in ARCH-Architecture Program; or must be in Construction Project Management Minor.
Credit Only Granted for: ARCH410 or ARCH462.

ARCH463 Sustainable Systems in Architecture (3 Credits)
Sustainable systems in architecture examines the nature of the global problem, environmental economics, understanding the local environment, bioclimatic design, solar control and shading, solar access zoning, residential scale energy design issues, commercial scale energy design issues, and urban scale energy design issues.
Restriction: Must be in a major in ARCH-Architecture Program.

ARCH464 Architectural Structures I (3 Credits)
This course covers the basic principles of architectural structures, including the influence of geometric, sectional, and material properties related to flexure and shear in beam and framed systems; vector mechanics with application to analysis of trusses, catenaries, and arches; diagrammatic analysis of beams for bending moment, shear, and deflection as well as the study of structural framing systems for vertical and lateral loads.
Restriction: Must be in a major in ARCH-Architecture Program.
Credit Only Granted for: ARCH411 or ARCH464.

ARCH465 Architectural Structures II (3 Credits)
The basic principles of elastic behavior for different materials such as wood, steel, concrete, and composite materials and compares the properties and applications of materials generally will be covered. It investigates cross sectional stress and strain behavior in flexure and in shear, and torsion as well as the stability of beams and columns. The qualitative behavior of combined stresses and fracture in materials is also covered.
Restriction: Must be in a major in ARCH-Architecture Program.
Credit Only Granted for: ARCH412 or ARCH465.

ARCH466 Environmental Systems in Architecture (3 Credits)
Environmental systems in architecture presents the theory, quantification, and architectural design implications for heating ventilating and air conditioning, water and waste, fire protection, electricity, illumination, acoustics, and vertical transportation.
Restriction: Must be in a major in ARCH-Architecture Program.
Credit Only Granted for: ARCH413 or ARCH466.

ARCH467 Integrated Project Delivery (3 Credits)
Integrated Project Delivery is examined from design to implementation through an exploration of building construction, architectural design and construction management perspectives.
Restriction: Must be in a major in ARCH-Architecture Program; or must be in Construction Project Management Minor.

ARCH470 Computer Applications in Architecture (3 Credits)
Introduction to computer utilization, with emphasis on architectural applications.
Prerequisite: ARCH400; or permission of ARCH-Architecture Program.
Restriction: Must be in Architecture (B.S.) program.

ARCH472 Building Information Modeling Communication and Collaboration (3 Credits)
Building Information Modeling is explored as pertains to collaboration and communication in the design and construction of buildings and building systems. Practical and empirical learning using BIM software and case studies of real world projects and construction scenarios.
Restriction: Must be in a major in ARCH-Architecture Program; or must be in the Construction Project Management Minor.
Credit Only Granted for: ARCH678I or ARCH472.
Formerly: ARCH678I.

ARCH474 Integrated Education in Architecture NAAB/IDP (1 Credit)
Examine National Architectural Accrediting Board (NAAB) student performance criteria in the context of architectural education. Contextualize NAAB accredited curricula and examine the relationship to graduate study and professional practice, including the Intern Development Program (IDP) of the National Council of Architectural Registration Boards (NCARB).
Restriction: Must be in a major in ARCH-Architecture Program.

ARCH478 Selected Topics in Architecture (1-4 Credits)
Selected Topics in Architecture
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH479 Independent Studies in Architecture (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH481 The Architect in Archaeology (3 Credits)
The role of the architect in field archaeology and the analysis of excavating, recording, and publishing selected archaeological expeditions.
Prerequisite: Permission of ARCH-Architecture Program.

ARCH482 The Archaeology of Roman and Byzantine Palestine (3 Credits)
Archaeological sites in Palestine (Israel and Jordan) from the reign of Herod the Great to the Moslem conquest.

ARCH483 Field Archaeology (3 Credits)
Participation in field archaeology with an excavation officially recognized by proper authorities of local government.
Prerequisite: Permission of ARCH-Architecture Program.

ARCH488 Selected Topics in Architectural Preservation (1-4 Credits)
Selected Topics in Architectural Preservation.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH489 Independent Studies in Architectural Preservation (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH600 Integrated Design Studio V (6 Credits)
Integrated and comprehensive building and site design. Course content bridges the gap between design and technology, between practice and education, in a studio setting. Explorations include the integration of conceptual and technical aspects of architectural form and assembly, highlighting the ways in which multiple layers of a building design are developed, coordinated and resolved.
Corequisite: ARCH611.
Restriction: Permission of ARCH-Architecture Program.

ARCH601 Topical Design Studio VI (6 Credits)
Topical architectural design studio with concentration on advanced topical inquiry addressing but not limited to: architectural competitions, sustainable design, theoretica/conceptual issues, programmatic, contextual, and/or technical issues.
Restriction: Permission of ARCH-Architecture Program.

ARCH608 Advance Special Topics Design Studio (6 Credits)
Topical architectural design studio with concentration on advanced theoretical, conceptual, technological, cultural or professional issue.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 12 credits if content differs.
Additional Information: Elective Architecture Design Studio that may be taken for repeat or advanced credit in place of ARCH404, ARCH405, ARCH406, ARCH407, ARCH600, ARCH601, ARCH700 or an additional design studio.

ARCH611 Advanced Architecture Technology Seminar (3 Credits)
Technology in design of buildings. Application of technological issues in building design; integration of technology in architecture; technology as a form determinant in architecture; other conceptual and philosophical issues related to the application of technology in the design, construction, and use of buildings.
Corequisite: ARCH600.
Restriction: Permission of ARCH-Architecture Program.

ARCH628 Selected Topics in Architectural History (1-4 Credits)
Graduate Selected Topics in Architectural History
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH629 Graduate Independent Studies in Architectural History (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH635 Seminar in the History of Modern Architecture (3 Credits)
Advanced investigation of historical problems in modern architecture.
Prerequisite: ARCH427; or permission of ARCH-Architecture Program.

ARCH654 Urban Development and Design Theory (3 Credits)
Advanced investigation into the history, and practice of urban design, planning, and development.
Restriction: Permission of ARCH-Architecture Program.

ARCH655 Urban Design Seminar (3 Credits)
Advanced investigation into problems of analysis and evaluation of the design of urban areas, spaces, and complexes with emphasis on physical and social considerations; effects of public policies through case studies. Field observations.
Prerequisite: ARCH654; or permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH451 or ARCH655.
Formerly: ARCH451.

ARCH670 Advanced Computer Applications in Architecture (3 Credits)
Advanced use of computer technology in design. Use of digital design processes and conceptual methodologies to study design alternatives and realization. Methods and techniques of digital design representation, simulation, or fabrication to explore and test concepts and integration of digital technologies into the architectural design process.
Restriction: Permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH678C or ARCH670.
Formerly: ARCH678C.

ARCH671 BIM Technology and Processes in Architecture (3 Credits)
Building Information Modeling is examined in depth relative to Integrated Project Delivery methods as pertains to collaboration and communication in the design and construction of buildings and building systems. Practical and empirical learning using BIM software and case studies of real world projects and construction scenarios.
Prerequisite: ARCH403; and ARCH470. Or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ARCH678I or ARCH670.
Formerly: ARCH678I.

ARCH672 Type and Typology Seminar (3 Credits)
The idea of type and typology, its implications for theory, scholarship, and practice in achitecture and urban design.
Restriction: Permission of ARCH-Architecture Program.

ARCH673 Building Culture Seminar (3 Credits)
Comprehension of major themes in the development of architectural building techniques and culture value systems in architecture are developed through lecture, discussion and analysis of seminal readings and buildings.
Restriction: Permission of ARCH-Architecture Program.

ARCH674 Seminar in Regionalism (3 Credits)
Regional characterisitics of culture, climate, and landscape as determinants world architecture.
Restriction: Permission of ARCH-Architecture Program.

ARCH676 Field Research in Architecture (3 Credits)
Recording and analysis of significant architectural complexes in situ.
Restriction: Permission of ARCH-Architecture Program.

ARCH678 Advanced Selected Topics in Architecture (1-4 Credits)
Graduate Selected Topics in Architecture.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH679 Advanced Independent Studies in Architecture (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH688 Advanced Selected Topics in Architectural Technologies (1-4 Credits)
Graduate Selected Topics in Architectural Technologies.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH689 Advanced Independent Studies in Architectural Technologies (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH700 Urban Design Studio VII (6 Credits)
Studio problems and theories concentrating on urbanism and urban design techniques. Issues and sites range from high density urban in-fill to suburban and greenfield development in American and other contexts. Studio theories explore such topics as Contextualism, Neo-Traditional design, Transit-Oriented Development, density, sustainable development building typology, and street design.
Restriction: Permission of ARCH-Architecture Program.

ARCH770 Professional Practice of Architecture (3 Credits)
Project management, organizational, legal, economic and ethical aspects of architecture.
Restriction: Permission of ARCH-Architecture Program.

ARCH778 Graduate Selected Topics in Urban Design (1-4 Credits)
Graduate Selected Topics in Urban Design.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH779 Advanced Independent Studies in Urban Design (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH797 Thesis Proseminar (3 Credits)
Directed research and preparation of thesis program.
Prerequisite: ARCH601.

ARCH798 Thesis in Architecture (3 Credits)
Complements the research of ARCH 799, with presentation of the design research to student's thesis committee.
Prerequisite: ARCH797.
Corequisite: ARCH799.
Restriction: Must be in Architecture (Master's) program; and permission of ARCH-Architecture Program; and minimum cumulative GPA of 3.0.

ARCH799 Master's Thesis Research (1-6 Credits)
Development of master's thesis.
Prerequisite: ARCH797.
Corequisite: ARCH798.
Restriction: Must be in Architecture (Master's) program; and permission of ARCH-Architecture Program; and minimum cumulative GPA of 3.0.
Repeatable to: 6 credits if content differs.

AREC - Agricultural and Resource Economics

AREC405 Economics of Production (3 Credits)
The use and application of production economics in analysis of firm and policy decisions. Production functions, cost functions, multiple product and joint production, and production processes through time.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC422 Econometric Applications in Agricultural and Natural Resource Economics (3 Credits)
The main goal of this course is to equip students with valuable skills in econometrics and data analysis. Specifically, the main goal of the course is to teach you the basics of the theory and practice of econometrics, and to give you experience in estimating econometric models with actual data.
Prerequisite: AREC326; or ECON326.
Restriction: Must be in a major within the AGNR-Agricultural & Resource Economics department.
Credit Only Granted for: ECON422, AREC422, or AREC489F.
Formerly: AREC489F.

AREC426 Economic Methods and Food Consumption Policy (3 Credits)
An overview of major econometric tools used by policy makers, economists and social scientists to analyze the effects of food consumption policy. Major food assistance programs in the United States such as SNAP, the School Lunch Program and the School Breakfast Program will be discussed.
Prerequisite: AREC326; or ECON326.
Credit Only Granted for: AREC489O or AREC426.
Formerly: AREC489O.

AREC427 Economics of Commodity Marketing Systems (3 Credits)
Basic economic theory as applied to the marketing of agricultural commodities. Current developments affecting market structure including contractual arrangements, cooperative marketing, vertical integration, and governmental policies.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC430 Introduction to Agricultural and Resource Law (3 Credits)
Survey of law with emphasis on problems and applications related to agricultural and natural resource economics. The course emphasizes strategies for managing legal risk arising from ownership, management, and use of agricultural resources. Students will get practical information to utilize in personal or professional settings. Contract law, constitutional law, tort law, property law, real estate transactions, business organization, estate planning, and debtor.
Prerequisite: ECON326 or AREC326.
Credit Only Granted for: AREC430 or AREC489K.
Formerly: AREC489K.

AREC431 Agricultural Water Quality: Policy and Legal Issues (3 Credits)
An overview of the American and Maryland legal systems and sources of legal information as it pertains to water quality and agriculture.
Prerequisite: AREC326; or ECON326; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: AREC489L or AREC431.
Formerly: AREC489L.

AREC433 Food and Agricultural Policy (3 Credits)
Economic and political context of governmental involvement in the farm and food sector. Historical programs and current policy issues. Analysis of economic effects of agricultural programs, their benefits and costs, and comparison of policy alternatives. Analyzes the interrelationship among international development, agricultural trade and general economic and domestic agricultural policies.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC435 Commodity Futures and Options (3 Credits)
The economics and institutional features of commodity futures and options markets. Students will develop a basic understanding of the underlying price relationships between cash and futures markets and will apply this information to business risk management decision making.
Prerequisite: AREC326; or ECON326; or students who have taken courses with comparable content may contact the department.

AREC445 Agricultural Development, Population Growth and the Environment (3 Credits)
Development theories, the role of agriculture in economic development, the agricultural policy environment, policies impacting on rural income and equity, environmental impacts of agricultural development.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC446 Sustainable Economic Development (3 Credits)
Examine why socially equitable and environmentally sustainable economic growth is difficult to achieve. It explores the interactive dynamics of environmental degradation, human capital, inequality and institutions. Emphasis is on the role of market imperfections and political failure in explaining the persistence of extractive economic institutions that hinder sustainable development.
Prerequisite: AREC326; or ECON326; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: AREC446 or AREC489G.
Formerly: AREC489G.

AREC447 The Economy of China (3 Credits)
An introductory survey course of economic development in China with emphasis on understanding the process of economic reform in mainland China since 1978.
Prerequisite: AREC326, ECON306, and ECON326.
Restriction: Must be in one of the following programs (Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness).

AREC453 Natural Resources and Public Policy (3 Credits)
Rational use and reuse of natural resources. Theory, methodology, and policies concerned with the allocation of natural resources among alternative uses. Optimum state of conservation, market failure, safe minimum standard, and cost-benefit analysis.
Prerequisite: ECON326 or AREC326; and students who have taken courses with comparable content may contact the department. Also offered as: ECON453.
Credit Only Granted for: AREC453 or ECON453.

AREC454 The Economics of Climate Change (3 Credits)
The role of economics in the formation of climate policy; basic concepts of environmental economics including efficiency, externalities, and policy instruments; economic models of intertemporal decisions and decision making in the face of uncertainty. Applied economic analysis of specific issues and current policy initiatives.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: AREC454 or AREC489C.
Formerly: AREC489C.

AREC455 Economics of Land Use (3 Credits)
Fundamentals of location theory. Microeconomics of land use decisions, including determination of rent and hedonic pricing models. Impacts of government decisions on land use, including regulation (e.g., zoning), incentives (transferable development rights), provision of public services, and infrastructure investments. Impacts of land use on environmental quality, including issues relating to sprawl, agricultural land preservation, and other topics of special interest.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC456 Energy and Environmental Economics (3 Credits)
Economic theory and empirical methods are used to study problems of energy, the environment, and the economy. It examines the extraction, production, and use of energy and market institutions and regulatory approaches used to correct market failures. Topics covered include: oil and natural gas markets, management and design of electricity markets, renewable energy, non-market valuation , climate change, and transportation policies.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: AREC456 or AREC489J.
Formerly: AREC489J.

AREC457 Energy, Climate Change, and Options for a Low-Carbon Economy (3 Credits)
Provides a primer in the physics and atmospheric chemistry of climate change, describes what the effects of climate change may be and explains how energy generation and use in various sectors of the economy contribute to greenhouse gas. It presents policy options meant to curb the use of fossil fuels (e.g., carbon taxes), improve energy efficiency (e.g., standards and incentives), and identifies possible drawbacks or unintended effects of such policies. Students will also study adaptation from the engineering, policy and anthropology points of view. The course further covers other aspects of climate change, as the potential effect of climate change on human health, cultural artifacts and the built environment, and sensitive ecological systems, and the legal implications of carbon storage options.
Recommended: ECON200. And AREC326; or ECON326.
Restriction: Junior standing or higher.

AREC481 Environmental Economics (3 Credits)
An exploration of the use of economic incentives for protection of the environment and the determination of appropriate (or efficient) level of environmental quality. Also covers the choice of policy instruments for the attainment of environmental standards.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230).
Restriction: Must be in one of the following programs (Economics Bachelor of Arts; Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness; Environmental Science & Policy-Env Economics). Also offered as: ECON481.
Credit Only Granted for: ECON481 or AREC481.

AREC489 Special Topics in Agricultural and Resources Economics (3 Credits)

AREC610 Microeconomic Applications in Agricultural and Resource Markets (3 Credits)
Applications of graduate level microeconomic analysis to the problems of agricultural and natural resource production and distribution including demand for agricultural output, the nature of agricultural supply decisions, decision making under uncertainty, valuation of natural resources, and exploitation of natural resources.
Prerequisite: ECON603.

AREC620 Optimization in Agricultural and Resource Economics (3 Credits)
Mathematical theory of static and dynamic optimization as applied to the economics of agriculture, natural resources and the environment. Topics include necessary and sufficient conditions for constrained optimization, convexity and concavity, duality and the envelope theorem, comparative statics, fixed point theorems, optimal control theory and dynamic programming.
Prerequisite: Must have completed Multivariate calculus and matrix or linear algebra.

AREC623 Applied Econometrics I (4 Credits)
A modern introduction to empirical strategies in applied micro research in fields like public policy, development economics, labor economics, education, marketing and corporate finance. Lectures focus on concepts and applications with the view that empirical work must address economically meaningful causal questions. Some theoretical and mathematical aspects of probability and statistics will be developed to assess the significance of the relationship among economic variables.
Prerequisite: Introductory statistics or econometrics; or permission of instructor.

AREC624 Applied Econometrics II (4 Credits)
Variations of the standard linear model, simultaneous equations estimation, nonlinear regression, nonlinear simultaneous equations estimation, static and dynamic panel data models, errors in variables, Hausman tests, discrete choice models such as conditional multinomial and mixed logit models, latent class models, semi-parametric estimation, varying parameter models, unobserved variables, time series models, and model selection procedures.
Prerequisite: AREC623.

AREC625 Economic Welfare Analysis (3 Credits)
The measurement of economic well-being for producers, consumers, and resource owners. Topics include competitive equilibrium, Pareto optimality, market failure, public goods and nonmarket welfare measurement, multimarket considerations, existing distortions, and second best. Applications in economic welfare analysis of agricultural and resource policies are discussed.Also offered as: AREC825.
Credit Only Granted for: AREC625 or AREC825.

AREC632 Agricultural Policy Analysis (3 Credits)
The economics of agricultural policies. Methods for analyzing costs and benefits of price supports, import restraints, and other policies for producers, consumers, and taxpayers. Farm programs of the U.S., other industrial countries and developing countries including interventions in both domestic markets and international trade are covered along with their consequences for factor owners and related commodity markets. Theories of the farm problem and possible remedies are offered.Also offered as: AREC832.
Credit Only Granted for: AREC632 or AREC832.

AREC645 Environment and Development Economics (3 Credits)
Considers neoclassical and endogenous growth models; international trade theory; the role of property right institutions and factor markets; the environmental impact of trade liberalization in developing countries and the environmental effects of increasing international capital mobility; empirical studies relating the environment to growth and globalization; and policy analyses.Also offered as: AREC845.
Credit Only Granted for: AREC645 or AREC845.

AREC699 Special Problems in Agricultural and Resource Economics (1-2 Credits)
Intensive study and analysis of specific problems in the field of agricultural and resource economics, providing in-depth information in areas of special interest to the student.

AREC783 Environmental Taxation and Regulation (3 Credits)
The economics of policies to address environmental externalities. Specific topics include the theory of public goods and externalities, cost-benefit and cost-effectiveness analysis of environmental regulations, regulatory instrument choice under uncertainty, environmental policy in an economy with pre-existing tax distortions, monitoring and enforcement of environmental regulations, distributional effects of environmental policy, and regulation of intertemporal externalities.
Prerequisite: ECON603 and ECON604; and graduate-level econometrics.
Credit Only Granted for: AREC783 or AREC869W.
Formerly: AREC869W.

AREC785 Advanced Economics of Natural Resources (3 Credits)
The use of exhaustible and renewable natural resources from normative and positive points of view. Analysis of dynamic resource problems emphasizing energy, mineral, groundwater, forestry, and fishery resources; optimal, equilibrium, and intergenerational models of resource allocation.
Prerequisite: Permission of AGNR-Agricultural & Resource Economics department; or (ECON603 and AREC623). Also offered as: ECON785.
Credit Only Granted for: AREC785 or ECON785.

AREC799 Master's Thesis Research (1-6 Credits)

AREC815 Experimental and Behavioral Economics (3 Credits)
An overview of the design, implementation, and analysis of experiments motivated by behavioral economics, with a particular focus on experiments in field settings. Topics covered include social preferences, risk aversion, prospect theory, present bias, overconfidence, and limited attention.
Prerequisite: AREC623, AREC624, ECON603, and ECON604; or equivalent.
Credit Only Granted for: AREC815 or AREC869A.
Formerly: AREC869A.

AREC825 Advanced Economic Welfare Analysis (3 Credits)
Theory of economic welfare measurement, problems of path dependence in evaluating multiple price changes, welfare measurement under risk, general equilibrium welfare measurement with multiple distortions, and applications in evaluation of agricultural and resource policies.Also offered as: AREC625.
Credit Only Granted for: AREC625 or AREC825.

AREC829 Policy Design and Causal Inference for Social Science (3 Credits)
Covers a number of empirical strategies in applied micro research to estimate the effects of a policy (or program) on the outcomes of interest. The topics covered represent the toolbox of modern causal inference in academic fields like public policy, development economics, labor economics, education, marketing and corporate finance, as well as in the industry and international organizations. Emphasis is given to the thought experiment, the hypothetical experiment that should be used to answer the causal question of interest.
Prerequisite: AREC624 and AREC623; or permission of instructor.
Repeatable to: 9 credits if content differs.

AREC832 Advanced Agricultural Policy Analysis (3 Credits)
Research problems in agricultural policy that include models and methods for explaining the consequences and causes of intervention in agricultural commodity markets. Quantitative, market level analysis of the implications of uncertainty, strategic behavior in international trade, second-best policies, the general equilibrium analysis of intervention, and the political economy of collective action in farm policy.Also offered as: AREC632.
Credit Only Granted for: AREC632 or AREC832.

AREC845 Environment and Development Economics (3 Credits)
Considers neoclassical and endogenous growth models; international trade theory; the role of property right institutions and factor markets; the environmental impact of trade liberalization in developing countries and the environmental effects of increasing international capital mobility; empirical studies relating the environment to growth and globalization; and policy analyses.Also offered as: AREC645.
Credit Only Granted for: AREC645 or AREC845.

AREC846 Development Microeconomics (3 Credits)
Development economics with focus on issues applicable to rural development and agriculture in developing countries. Content includes both theory and empirical application of theory. Subjects covered include economics of agricultural households, credit and insurance markets, technological progress and learning and institutional economics of developing countries.
Prerequisite: AREC624, ECON603, and AREC623; or equivalent.
Formerly: AREC869E.

AREC847 Networks, Social Learning and Technology Adoption (3 Credits)
This class will focus on networks, learning from others, and peer effects and the role ofeach in human capital accumulation, technology adoption and behavior. The material isfocused on applications of education, health agriculture and entrepreneurship in developingcountries, but will draw heavily from literatures on these effects in developed countries aswell. The class will cover the theory of networks and learning but its primary focus will beon the empirical difficulty of identifying these effects and establishing causality.
Prerequisite: AREC624, AREC623, and ECON603; and students who have taken courses with comparable content may contact the department.

AREC869 Advanced Topics in Agricultural and Resource Economics (1-3 Credits)
Frontiers of research in environmental and resource economics; agricultural policy, production, and trade; and development. Topics may include decision making under risk and related market institutions, principal agent analysis, optimal policy design, technology adoption, market structure, land and credit markets, information markets, and income distribution.
Repeatable to: 9 credits if content differs.

AREC891 Introduction to Prospectus Development (1 Credit)
Critical evaluation of research, prospectus topic exploration including literature review, data identification, model development, and related presentations. Required of all second-year Ph.D. students.
Prerequisite: Completion of the first year of graduate study in AREC.
Credit Only Granted for: AREC 869K or AREC 891.
Formerly: AREC869K.

AREC892 Dissertation Prospectus Development (3 Credits)
Presentations of proposed dissertation research including literature review, model development, data identification, and written prospectus development. Required of all third-year Ph.D. students.
Prerequisite: Completion of two years of the AREC Ph.D. program.
Credit Only Granted for: AREC 869P or AREC 892.
Formerly: AREC869P.

AREC898 Pre-Candidacy Research (1-8 Credits)

AREC899 Doctoral Dissertation Research (1-8 Credits)

ARHU - Arts and Humanities

ARHU439 Interdisciplinary Studies in Arts and Humanities (3 Credits)
An interdisciplinary exploration of chronological, geographical or thematic topics in Arts and Humanities.
Repeatable to: 6 credits if content differs.

ARHU468 Peer Mentoring Program (1 Credit)
A workshop for sophomore, junior or senior students who wish to serve as peer mentors helping first-year students to cope with the numerous issues which often arise in the transition to the university.
Restriction: Sophomore standing or higher; and permission of ARHU-College of Arts & Humanities.
Repeatable to: 3 credits if content differs.

ARHU486 Internship Practicum in Arts and Humanities (3-6 Credits)
An internship intended for students who have already completed an internship for credit. ARHU486 must be a different experience from the internship students have already taken for credit. Generally students intern with a different company, but they may continue working for the same company if the job is significantly different. See ARHU internship coordinator for details.
Prerequisite: Have completed previous internship at U of MD.
Restriction: Must be in a major in ARHU-College of Arts & Humanities; and permission of ARHU-College of Arts & Humanities; and minimum cumulative GPA of 2.5; and must have earned a minimum of 60 credits; and completed 12 credits at U of MD.

ARHU489 Advanced Internship Practicum in ARHU (3-6 Credits)
Designed for students who have already completed at least 2 upper level internship courses for academic credit. It is an advanced practicum to assist students in continuing to develop and hone their professional writing, presentation and analytical skills.
Prerequisite: ARHU486.
Restriction: Must be in a major in ARHU-College of Arts & Humanities; and minimum cumulative GPA of 2.5; and permission of instructor.
Repeatable to: 6 credits if content differs.
Additional Information: Course is designed to follow ARHU486.

ARHU498 Special Topics in Arts and Humanities (3 Credits)

ARHU786 Leadership and Professional Development Internship (1-6 Credits)
Professional development for graduate students interested in careers in non-academic organizations and in administrative positions in academic institutions. See department graduate program director for internship guidelines and applicability to graduate program requirements.
Prerequisite: Must have completed one semester of full-time graduate study; and permission of ARHU-College of Arts & Humanities.

ARHU788 Profession Development Seminar (1-3 Credits)
Professional development for academic and non-academic careers in the arts and humanities.
Repeatable to: 9 credits if content differs.

ARHU789 Professional Development Practicum (1-6 Credits)
Graduate students, in various disciplines within the college of Arts and Humanities, will learn the theory and principles of a specific issue or skill set related to academic or non-academic work. They will create original work in a hands-on practicum format.
Restriction: Must have completed at least the equivalent of one year of full-time graduate study; and permission of instructor.
Repeatable to: 6 credits if content differs.

ARMY - Army

ARMY401 Advanced Military Leadership III (3 Credits)
Introduces contracted students to the study of Army structure, practices and processes exercised by Army Commanders and Staff in completing personnel, logistics, training and combat operations. Includes a laboratory in applied leadership skills and two field exercises.

ARMY402 Advanced Military Leadership IV (3 Credits)
The military system and code of ethics in the military environment is studied. Topics include code of conduct during all forms of military operations, the Geneva Conventions and the ethical decision making process. Also includes a laboratory in applied leadership skills, fitness excellence and two field exercises.

ARSC - Air Science

ARSC400 National Security Forces in Contemporary American Society I (3 Credits)
Study of American national security policy and processes to include information and implementation, impact of major national and international actors, and development of major policy issues. This course will satisfy credit towards a minor in military studies.
Prerequisite: Permission of UGST-AFROTC-Air Science; or (ARSC300 or ARSC301).
Corequisite: ARSC059; or permission of UGST-AFROTC-Air Science.
Restriction: Senior standing.

ARSC401 National Security Forces in Contemporary American Society II (3 Credits)
This course examines various subjects including: military law/justice, preparation for active duty, and current issues affecting military professionalism. This course will satisfy credit towards a minor in military studies.
Prerequisite: ARSC300 or ARSC301; or permission of UGST-AFROTC-Air Science.
Corequisite: ARSC059; or permission of UGST-AFROTC-Air Science.
Restriction: Senior standing.

ARTH - Art History & Archaeology

ARTH418 Special Problems in Italian Renaissance Art (3 Credits)
Focus upon aspects of painting, sculpture, and architecture of Renaissance.
Repeatable to: 6 credits if content differs.

ARTH426 Renaissance and Baroque Sculpture in Northern Europe (3 Credits)
Sculpture in France, Germany, England, and the Low Countries from the fourteenth to the seventeenth century.

ARTH456 Photography Since World War II (3 Credits)
An exploration of the many uses and meanings of photography since 1945.

ARTH465 The Landscape in Modern and Contemporary Art (3 Credits)
A consideration of the representations of outdoor spaces since 1850. Focuses on the ways in which artists have understood and tried to make sense of modern and postmodern cities, suburbs, and rural areas.

ARTH466 Feminist Perspectives on Women in Art (3 Credits)
Principal focus on European and American women artists of the 19th and 20th centuries, in the context of the new scholarship on women.

ARTH484 Modern Chinese Film and Visual Culture (3 Credits)
Modern Chinese culture, society, and history studied through examples of art, film, and visual culture.Also offered as: FILM426.
Credit Only Granted for: ARTH484; ARTH489F in F2012, F2011, F2008, or S2009; or ARTH488F in S2010, S2008, or F2009 or FILM426.
Formerly: ARTH489F in F2012, F2011, F2008, or S2009; or ARTH488F in S2010, S2008, or F2009.

ARTH485 Chinese Painting (3 Credits)
Chinese painting history from the second century B.C. through the twentieth century, covering cultural, stylistic and theoretical aspects.

ARTH486 Japanese Painting (3 Credits)
Japanese painting from the sixth through the nineteenth century, including Buddhist icon painting, narrative scrolls, and Zen-related ink painting.

ARTH488 Colloquium in Art History (3 Credits)
Colloquium to investigate a specific topic in depth.
Prerequisite: Permission of ARHU-Art History & Archaeology department.
Repeatable to: 9 credits if content differs.

ARTH489 Special Topics in Art History (3 Credits)

ARTH496 Methods of Art History and Archaeology (3 Credits)
Methods of research and criticism applied to typical art-historical/archaeological problems, familiarizing the student with bibliography and other research tools. Introduction to the historiography of art history and archaeology, surveying the principal theories, encouraging methodological debates within the discipline. Course for majors who intend to go on to graduate school.
Prerequisite: Permission of ARHU-Art History & Archaeology department.
Restriction: Must be in Art History program.

ARTH498 Directed Studies in Art History I (2-3 Credits)

ARTH499 Honors Thesis (1-6 Credits)

ARTH608 Studies in Ancient Art and Archaeology (3 Credits)

ARTH609 Studies in Late Roman, Early Christian, and Byzantine Art (3 Credits)

ARTH618 Studies in Medieval Art (3 Credits)

ARTH619 Studies in Italian Renaissance Art (3 Credits)

ARTH628 Studies in Fourteenth and Fifteenth Century Northern European Art (3 Credits)

ARTH629 Studies in Sixteenth-Century Northern European Art (3 Credits)

ARTH638 Studies in Seventeenth-Century Southern European Art (3 Credits)

ARTH639 Studies in Seventeenth-Century Northern European Art (3 Credits)

ARTH648 Studies in Eighteenth-Century European Art (3 Credits)

ARTH649 Studies in Nineteenth-Century European Art (3 Credits)

ARTH658 Studies in American Art (3 Credits)

ARTH659 Studies in Twentieth-Century Art (3 Credits)

ARTH668 Studies in Latin American Art and Archaeology (3 Credits)

ARTH669 Studies in African Art (3 Credits)

ARTH678 Studies in Chinese Art (3 Credits)

ARTH679 Studies in Japanese Art (3 Credits)

ARTH689 Selected Topics in Art History (1-3 Credits)

ARTH692 Methods of Art History (3 Credits)
Methods of research and criticism applied to typical art-historical problems; bibliography and other research tools.

ARTH699 Special Topics in Art History (3 Credits)
Prerequisite: consent of department head or instructor.
Restriction: Permission of instructor; or permission of ARHU-Art History & Archaeology department.

ARTH708 Seminar in Ancient Art and Archaeology (3 Credits)

ARTH709 Seminar in Late Roman, Early Christian, and Byzantine Art (3 Credits)

ARTH718 Seminar in Medieval Art (3 Credits)

ARTH719 Seminar in Italian Renaissance Art (3 Credits)

ARTH728 Seminar in Fourteenth and Fifteenth-Century Northern European Art (3 Credits)

ARTH729 Seminar in Sixteenth-Century Northern European Art (3 Credits)

ARTH738 Seminar in Seventeenth-Century Southern European Art (3 Credits)

ARTH739 Seminar in Seventeenth-Century Northern European Art (3 Credits)

ARTH748 Seminar in Eighteenth-Century European Art (3 Credits)

ARTH749 Seminar in Nineteenth-Century European Art (3 Credits)

ARTH758 Seminar in American Art (3 Credits)

ARTH759 Seminar in Twentieth-Century Art (3 Credits)

ARTH768 Seminar in Latin American Art and Archaeology (3 Credits)

ARTH769 Seminar in African Art (3 Credits)

ARTH778 Seminar in Chinese Art (3 Credits)

ARTH779 Seminar in Japanese Art (3 Credits)

ARTH789 Selected Topics in Art History (1-3 Credits)

ARTH798 Directed Graduate Studies in Art History (3 Credits)

ARTH799 Master's Thesis Research (1-6 Credits)

ARTH898 Pre-Candidacy Research (1-8 Credits)

ARTH899 Doctoral Dissertation Research (1-8 Credits)

ARTT - Art Studio

ARTT409 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ARTT418 Advanced Drawing Studio (3 Credits)
Multi-level drawing studio emphasizing advanced concepts and processes related to drawing; emphasis on contemporary art issues and individual directions.
Prerequisite: ARTT200, ARTT210, and ARTT150; and must have completed one 300-level studio course. Or permission of ARHU-Art department.
Repeatable to: 12 credits.

ARTT428 Advanced Painting Studio (3 Credits)
Multi-level painting studio emphasizing advanced concepts and processes related to oil and acrylic painting; emphasis on contemporary art issues and individual directions in chosen media.
Prerequisite: ARTT320.
Repeatable to: 12 credits.

ARTT438 Advanced Sculpture Studio (3 Credits)
Multi-level sculpture studio; continuation of media-specific sculpture courses with emphasis on contemporary art issues and individual directions in chosen media.
Prerequisite: Must have completed one 300-level sculpture course; or permission of ARHU-Art department.
Repeatable to: 12 credits.

ARTT448 Advanced Printmaking Studio (3 Credits)
Multi-level printmaking studio; continuation of media-specific printmaking courses with emphasis on contemporary art issues and individual directions in chosen media.
Prerequisite: Must have one 300-level printmaking course; or permission of ARHU-Art department.
Repeatable to: 12 credits.

ARTT449 Advanced Photography Studio (3 Credits)
Advanced photographic processes and theory. Emphasis on contemporary art issues and individual directions.
Prerequisite: ARTT353; or permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT454 Advanced Graphic Design Principles: Design in Society (3 Credits)
Focus on social responsibility and community activism. History and theory of propaganda and advocacy-based design. Students explore current design practices, work individually, and collaborate in teams with non-profits or other clients with community-based or socio-cultural agendas. Research and writing-intensive course.
Prerequisite: ARTT355 and ARTT356.

ARTT455 Three Dimensional Graphic Design (3 Credits)
Continued exploration of advanced graphic design practices with primary emphasis on 3-D object and packaging design. Includes research, course reading discussion, oral presentations, and specific project assignments which will require a proficient level of hand-skills (craft) and computer skills.
Prerequisite: ARTT355, ARTT356, and ARTT357.
Recommended: ARTT333.
Credit Only Granted for: ARTT352 or ARTT455.
Formerly: ARTT352.

ARTT456 Motion Design (3 Credits)
Explores computer graphics and visual communication principles in a time-based context. Examination of fundamental design principles through digital projects that involve photo manipulation, digital illustration, layout, animation, and web design.
Prerequisite: ARTT355, ARTT356, and ARTT357; or permission of ARHU-Art department.

ARTT457 Advanced Interactive Design (3 Credits)
Advanced concepts and techniques of interactive design and interactive software. Examination of corporate, client-based, and public service-based interactive graphic design. Emphasis on web-based interactive design structures.
Prerequisite: ARTT357.

ARTT458 Graphic Design Portfolio (3 Credits)
Creation of a comprehensive professional portfolio. Curriculum includes portfolio preparation and presentation, contracts, copyright issues, interviewing skills, resume and cover-letter writing, design briefs and proposals, and freelance business issues. Portfolio presentation includes basics of book arts.
Prerequisite: ARTT454.
Repeatable to: 9 credits if content differs.

ARTT459 Advanced Graphic Design Studio (3 Credits)
Student-run design firm working with non-profits and other organizations. Organizations act as clients; the students as a creative firm. Under guidance and supervision of faculty, students learn first-hand about working with clients, working within a budget, working with printers and press runs, and working under real deadlines.
Prerequisite: ARTT454; or permission of ARHU-Art department.
Repeatable to: 9 credits if content differs.

ARTT460 Seminar in Art Theory (3 Credits)
Exploration of relationship between content and processes of art in a contemporary multi-cultural context.
Restriction: Senior standing.

ARTT468 Seminar on the Interrelationship Between Art and Art Theory (3 Credits)
The relationship between a student's work and the theoretical context of contemporary art.
Restriction: Junior standing or higher; or permission of ARHU-Art department.
Repeatable to: 6 credits if content differs.

ARTT469 Professional Practice (3 Credits)
Business aspects of being an artist, with an emphasis on starting and maintaining a professional career.
Restriction: Senior standing; or permission of ARHU-Art department.
Repeatable to: 6 credits if content differs.
Formerly: ARTT462.

ARTT479 Advanced Digital Media Studio (3 Credits)
Variable multi-level studio emphasizing advanced concepts and processes related to time-based, projection, installation, interactive, and audio/visual integrated digital art. Emphasis on contemporary art issues and individual directions.
Prerequisite: ARTT370; or permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT480H Honors Seminar (3 Credits)
Team-taught seminar focusing on relationship between student's work and the theoretical context of contemporary art.

ARTT481 Advanced Specialization Seminar (3 Credits)
Seminar combines contemporary art theory, criticism, professional practice and career preparation in relation to students works from all areas of specialization.
Prerequisite: Permission of ARHU-Art department.

ARTT487 Capstone for Citation in Interdisciplinary Multimedia and Technology (1 Credit)
Independent study: a paper or website synthesizing the various citation learning experiences.
Prerequisite: Permission of ARHU-Art department.

ARTT488 Advanced Special Topics in Graphic Design (1-3 Credits)
Variable topics in Graphic Design theory and practice.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 6 credits if content differs.

ARTT489 Advanced Special Topics in Art (1-3 Credits)
Advanced studio art and theory within the context of a special topic.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT498 Directed Studies in Studio Art (1-3 Credits)
Advanced independent work in Studio Art. Meeting with faculty and studio time arranged.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT499 Directed Studies in Graphic Design (1-3 Credits)
Advanced independent studies in Graphic Design. Meetings with faculty and studio time arranged.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT618 Drawing (3 Credits)
Independent studies in drawing for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT628 Painting (3 Credits)
Graduate painting for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT638 Sculpture (3 Credits)
Independent studies in sculpture for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT648 Printmaking (3 Credits)
Independent studies in printmaking for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT689 Special Problems in Studio Art (3 Credits)

ARTT698 Directed Graduate Studies in Studio Art (1-4 Credits)
Independent work. Meetings with faculty and studio time arranged.
Prerequisite: Permission of ARHU-Art department.
Restriction: Must be in Studio Art (Master's) program.
Repeatable to: 12 credits if content differs.
Formerly: ARTS698.

ARTT699 Directed Graduate Studies in Studio Art (1-4 Credits)
Independent graduate studies.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits.

ARTT718 Drawing (3 Credits)
Independent studies in drawing for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT728 Painting (3 Credits)
Independent studies in painting for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT738 Sculpture (3 Credits)
Independent studies in sculpture for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT748 Printmaking (3 Credits)
Independent studies in printmaking for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT768 Graduate Colloquium (2 Credits)
Examines various aspects of art, art theory and criticism in a contemporary and multi-cultural context. Relates student work to this context.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT798 Directed Graduate Studies in Studio Art (1-4 Credits)
Independent graduate studies.
Restriction: Must be in Studio Art (Master's) program.
Repeatable to: 12 credits if content differs.
Formerly: ARTS798.

ARTT799 Master's Thesis Research (1-6 Credits)

ASTR - Astronomy

ASTR406 Stellar Structure and Evolution (3 Credits)
Study of stellar internal structure, nuclear reactions, and energy transport. Study of stellar evolution of both low-mass and high-mass stars, including the stellar end states of white dwarfs, neutron stars, and black holes.
Prerequisite: ASTR320; or permission of CMNS-Astronomy department.
Credit Only Granted for: ASTR 498N or ASTR 406.
Formerly: ASTR 498N.

ASTR410 Radio Astronomy (3 Credits)
Introduction to current observational techniques in radio astronomy. The radio sky, radiophysics, coordinates and catalogs, antenna theory, Fourier transforms, interferometry and arrays, aperture synthesis, and radio detectors.
Prerequisite: ASTR121; and (PHYS271 and PHYS270; or PHYS273). Or permission of CMNS-Astronomy department.

ASTR415 Computational Astrophysics (3 Credits)
Introduction to the most important computational techniques being used in research in astrophysics. Topics include modern high performance computer architectures, scientific visualization and data analysis, and detailed descriptions of numerical algorithms for the solution to a wide range of mathematical systems important in astrophysics.
Prerequisite: ASTR121; and (PHYS271 and PHYS270; or PHYS273). Or permission of CMNS-Astronomy department.

ASTR421 Galaxies (3 Credits)
Introduction to structure, kinematics, and dynamics of normal and peculiar galaxies. Quantitative descriptions of normal spiral galaxies (like our Milky Way) and elliptical galaxies will be followed by more exotic considerations such as interacting and merging galaxies, and active galactic nuclei.
Prerequisite: ASTR121; and (PHYS271 and PHYS270; or PHYS273). Or permission of CMNS-Astronomy department.

ASTR422 Cosmology (3 Credits)
Introduction to modern cosmology. Topics include large scale structure of universe, the intergalactic medium, the nature of dark matter cosmological models and galaxy formation.
Prerequisite: Must have completed or be concurrently enrolled in ASTR320; or permission of CMNS-Astronomy department.

ASTR430 The Solar System (3 Credits)
Formation and evolution of the Solar System. Planetary surfaces, interiors, atmospheres, and magnetospheres. Asteroids, comets, planetary satellites, and ring systems. Emphasis on using basic physics to understand observed properties of the Solar System. Intended for students majoring in the physical sciences.
Prerequisite: ASTR121; and (PHYS271 and PHYS270; or PHYS273). Or permission of CMNS-Astronomy department.

ASTR435 Astrophysics of Exoplanets (3 Credits)
Introduction to exoplanets. Topics include historical development, advantages, and limitations of detection methods, the statistics of exoplanet characteristics, the bulk properties of known expolanets, and remote sensing for characterization of exoplanets.
Prerequisite: ASTR121; and (PHYS273; or (PHYS270 and PHYS271)). Or permission of CMNS-Astronomy department.
Credit Only Granted for: ASTR 498X or ASTR 435.
Formerly: ASTR 498X.

ASTR450 Orbital Dynamics (3 Credits)
Vectorial mechanics, motion in a central force field, gravitational and non-gravitational forces, the two-body and three-body problems, orbital elements and orbital perturbation theory, resonances in the solar system, chaos. Intended for students majoring in any of the physical sciences.
Prerequisite: Must have completed or be concurrently enrolled in ASTR320; or permission of CMNS-Astronomy department.

ASTR480 High Energy Astrophysics (3 Credits)
The structure, formation, and astrophysics of compact objects, such as white dwarfs, neutron stars, and black holes, are examined. Phenomena such as supernovae and high-energy particles are also covered.
Prerequisite: Must have completed or be concurrently enrolled in ASTR320; or permission of CMNS-Astronomy department.

ASTR498 Special Problems in Astronomy (1-6 Credits)
Research or special study. Credit according to work done.
Restriction: Must be in one of the following programs (Physics; Astronomy) ; and permission of CMNS-Astronomy department.

ASTR601 Radiative Processes (3 Credits)
Emission, absorption, and scattering of radiation by matter, with astrophysical applications. Thermodynamics and statistical mechanics: LTE, Boltzmann, and Saha equations; radiative transfer; atomic and molecular radiation; plasma radiation and transfer. bremsstrahlung, synchrotron emission, Compton scattering.
Restriction: Permission of CMNS-Astronomy department.

ASTR606 Stellar Structure and Evolution (3 Credits)
Models of stellar atmospheres, methods of determinins properties of stars, physical principles governing stellar interior processes, observational data for determining stellar evolution, nuclear processes, stellar modeling.
Prerequisite: ASTR601; or permission of CMNS-Astronomy department.

ASTR610 Astronomical Instrumentation and Techniques (3 Credits)
Review of Maxwell's equations; designs of telescopes, spectrographs, modern detectors; basic concepts for radio detectors and telescopes; interferometry and data processing.
Restriction: Permission of CMNS-Astronomy department.

ASTR615 Computational Astrophysics (3 Credits)
Introduction to computational techniques used in astrophysical research. Topics include modern high performance computer architectures, scientific visualization and data analysis, and detailed descriptions of numerical algorithms for the solution to a wide range of mathematical systems important in astrophysics.
Restriction: Permission of CMNS-Astronomy department.
Formerly: ASTR688C.

ASTR620 Galaxies (3 Credits)
Galaxy classifications; Milky way: basic data, distribution of stars, gas, dust and relativistic particles, large-scale structure and rotation; Spiral galaxies: stellar dynamics and stability, density waves, star bursts, galactic center; Elliptical galaxies: stellar dynamics, cannabalism; galaxy formation.
Restriction: Permission of CMNS-Astronomy department.

ASTR622 Cosmology (3 Credits)
Introduction to modern cosmology. Topics include the large scale structure of the universe, cosmological models, the Big Bang, the cosmic microwave background, the nature of dark matter, and galaxy formation.
Restriction: Permission of CMNS-Astronomy department.
Credit Only Granted for: ASTR622 or ASTR688R.
Formerly: ASTR688R.

ASTR630 Planetary Science (3 Credits)
The science of our planetary system with an emphasis on the aspects of it, that help us understand the origin of the system and thus the relevance to other planetary systems. Topics will include planetary atmospheres, surfaces, and interiors and the small bodies of the solar system (asteroids, comets, Kuiper-belt objects). We will consider the dynamics of these bodies and the physics and chemistry of these bodies.
Restriction: Permission of CMNS-Astronomy department.
Credit Only Granted for: ASTR630 or ASTR688P.
Formerly: ASTR688P.

ASTR670 Interstellar Medium and Gas Dynamics (3 Credits)
Content of phases of the interstellar medium: physical processes in the ISM: ionization equilibrium, heating and cooling, interstellar dust; gas dynamics: fluid motions, instabilities, shock waves; magnetohydrodynamics.
Prerequisite: ASTR601; or permission of CMNS-Astronomy department.

ASTR680 High Energy Astrophysics (3 Credits)
The structure, formation, and astrophysics of compact objects, such as white dwarfs, neutron stars, and black holes, are examined.
Restriction: Permission of CMNS-Astronomy department.
Formerly: ASTR688M.

ASTR688 Special Topics in Modern Astronomy (1-3 Credits)
Special topics such as extragalactic radio sources, plasma astrophysics, the H.R. diagram, chemistry of the interstellar medium, radiophysics of the sun.
Restriction: Permission of instructor.

ASTR690 Reasearch Project I (3 Credits)

ASTR695 Introduction to Research (1 Credit)
Provides an introduction to research programs in the Department of Astronomy and a forum to explore possible research projects. Aimed at incoming graduate students.

ASTR699 Special Problems in Advanced Astronomy (1-6 Credits)

ASTR788 Selected Topics in Modern Astronomy (1-3 Credits)

ASTR799 Master's Thesis Research (1-6 Credits)

ASTR898 Pre-Candidacy Research (1-8 Credits)

ASTR899 Doctoral Dissertation Research (1-8 Credits)

BCHM - Biochemistry

BCHM461 Biochemistry I (3 Credits)
First semester of a comprehensive introduction to modern biochemistry. Structure, chemical properties, and function of proteins and enzymes, carbohydrates, lipids, and nucleic acids. Basic enzyme kinetics and catalytic mechanisms.
Prerequisite: Minimum grade of C- in CHEM271 and CHEM272; or minimum grade of C- in CHEM276 and CHEM277.
Credit Only Granted for: BCHM461 or BCHM463.

BCHM462 Biochemistry II (3 Credits)
A continuation of BCHM 461. Metabolic pathways and metabolic regulation, energy transduction in biological systems, enzyme catalytic mechanisms.
Prerequisite: Minimum grade of C- in BCHM461.
Credit Only Granted for: BCHM462 or BCHM463.

BCHM463 Biochemistry of Physiology (3 Credits)
A one-semester introduction to general biochemistry. A study of protein structure, enzyme catalysis, metabolism, and metabolic regulation with respect to their relationship to physiology.
Prerequisite: Minimum grade of C- in CHEM271 and CHEM272; or minimum grade of C- in CHEM276 and CHEM277.
Credit Only Granted for: BCHM461, BCHM462 or BCHM463.

BCHM464 Biochemistry Laboratory (3 Credits)
Biochemical and genetic methods for studying protein function. Site-directed mutagenesis and molecular cloning, protein purification, enzyme activity assays, computer modeling of protein structure.
Prerequisite: BCHM461 or BCHM463; and a grade of C- or better in the prerequisite is required for all College of Computer, Mathematical, and Natural Sciences majors and recommended for all students.
Corequisite: BCHM465.
Restriction: BCHM, CHEM, and Nutritional Sciences majors have first priority, followed by other life science majors.

BCHM465 Biochemistry III (3 Credits)
CORE Capstone (CS) Course. An advanced course in biochemistry. Biochemical approach to cellular information processing. DNA and RNA structure. DNA replication, transcription, and repair. Translation of mRNA to make proteins.
Prerequisite: BCHM461 or BCHM463; and a grade of C- or better in the prerequisite is required for College of Computer, Mathematical, and Natural Sciences majors and recommended for all students.
Recommended: BCHM462.

BCHM485 Physical Biochemistry (3 Credits)
Physical Chemistry with applications to biological systems. Principal topics: quantum chemistry, spectroscopy, structural methods for biological macromolecules, statistical thermodynamics, transport processes in liquid phase, chemical and biochemical kinetics, modeling and simulation, polymer dynamics.
Prerequisite: Minimum grade of C- in CHEM481.
Restriction: Must be in Biochemistry program; or permission of instructor.
Credit Only Granted for: CHEM482 or BCHM485.

BCHM661 Nucleic Acids I (2 Credits)
Topics covered: Chemistry and structure of DNA and RNA, from nucleotides to chromatin, chromosomes, and genomes, and some methods for studying, synthesizing, sequencing and manipulating nucleic acids. Rudimentary genomics and bioinformatics. DNA Biology: selected aspects of the biochemistry and regulation of DNA replication, repair, and recombination, and how these processes interact with each other.
Prerequisite: BSCI410 and BCHM465.

BCHM662 Nucleic Acids II (2 Credits)
Topics covered: Interactions between nucleic acids and ligands such as cations, drugs, and especially proteins. Sources of binding affinity and specificity. Selection-amplification methods. Description of several classes of protein-nucleic acids complexes. DNA/RNA catalysis, the origin of life, mobile genetic elements.
Prerequisite: BCHM661.

BCHM668 Special Problems in Biochemistry (2-4 Credits)

BCHM669 Special Topics in Biochemistry (1-3 Credits)

BCHM671 Protein Chemistry and Enzymic Catalysis (3 Credits)
Principles of protein structure, folding, and function, experimental characterization of structure, active sites, enzyme mechanisms and kinetics.
Prerequisite: BCHM461; or students who have taken courses with comparable content may contact the department.

BCHM673 Regulation of Metabolism (3 Credits)
Intracellular milieu, compartmentation, metabolic and enzymic approaches to identifying control points, regulation by covalent modification of enzymes, metabolic disorders.
Prerequisite: BCHM462 or BCHM463; or students who have taken courses with comparable content may contact the department.

BCHM675 Biophysical Chemistry (3 Credits)
Conformation, shape, structure, conformational changes, dynamics and interactions of biological macromolecules and complexes or arrays of macromolecules. Physical techniques for studying properties of biological macromolecules.
Prerequisite: CHEM481 and BCHM461; or students who have taken courses with comparable content may contact the department.

BCHM676 Biological Mass Spectrometry (3 Credits)
Fundamentals of modern mass spectrometry and use with biochemical techniques to provide unique analyses of drug metabolites, lipids, carbohydrates, nucleotides and proteins. The interface with bioinformatics will be examined, which provides the foundation of proteomics.
Prerequisite: BCHM461 or BCHM463.
Formerly: BCHM669B.

BCHM677 Computational Tools in Biochemistry (1 Credit)
A practical, hands-on introduction to the application of computational tools that support biochemistry research. Selected topics may include: efficient use of scientific literature databases and the preparation of professional bibliographies; proteomics and mass spectrometry; bioinformatics and genomics programs an database resources; molecular structure visualization and modeling; quatitative data fitting and error analysis; and laboratory research ethics.
Prerequisite: BCHM674 or BCHM671; or permission of instructor.
Restriction: Must be in one of the following programs (Biochemistry (Master's); Biochemistry (Doctoral)) ; or permission of instructor.

BCHM698 Literature Seminar in Biochemistry (2 Credits)
Students will prepare and present a departmental seminar based on a topic in the current biochemical research literature.
Repeatable to: 2 credits if content differs.

BCHM699 Special Problems in Biochemistry (1-6 Credits)
Laboratory experience in a research environment. Restricted to students in the non-thesis M.S. option.
Prerequisite: Must have completed one semester of graduate study in biochemistry; and must be in the Biochemistry Masters program non-thesis M.S. option.
Repeatable to: 6 credits if content differs.

BCHM799 Master's Thesis Research (1-6 Credits)

BCHM889 Seminar (1-3 Credits)

BCHM898 Pre-Candidacy Research (1-8 Credits)

BCHM899 Doctoral Dissertation Research (1-8 Credits)

BEES - Behavior, Ecology, Evolution and Systematics

BEES608 Seminar in Behavior, Ecology, Evolution and Systematics (1-4 Credits)
One seminar per week for each subject selected: Behavior; Ecology; Evolution; Systematics; Behavior, Ecology, Evoultion and Systematics.
Repeatable to: 15 credits if content differs.

BEES609 Special Topics in Behavior, Ecology, Evolution and Systematics (1-6 Credits)
Lectures, experimental courses and other special instructions in topics appropriate for Behavior, Ecology, Evolution and Systematics (BEES) students.
Repeatable to: 12 credits if content differs.

BEES708 Advanced Topics in Behavior, Ecology, Evolution, and Systematics (1-4 Credits)
Lectures, experimental courses, and other special instruction in various behavioral, ecology, evolution and systematics subjects.
Repeatable to: 12 credits if content differs.

BEES799 Master's Thesis Research (1-6 Credits)

BEES898 Pre-Candidacy Research (1-8 Credits)

BEES899 Doctoral Dissertation Research (1-8 Credits)

BERC - Ctr for Stdy of Busns,Ethics,Regulatn,Crime

BERC600 Legal and Regulatory Compliance (3 Credits)
Global anticorruption law (including the Foreign Corrupt Practices Act, the UK Bribery Act, the OECDs Convention on Combating Bribery of Foreign Public Officials in International Business Transactions, Canadas Corruption of Public Officials Act, and the Inter American Convention Against Corruption). Sarbanes Oxley compliance (including certification requirements, whistleblower protection, and audit committees). Financial integrity (including money laundering, insider trading, market manipulation, conflicts of interest, and privacy). Internal investigations or attorney client privilege. Compliance (antitrust, food and drug, environmental, occupational safety and health).

BERC601 White-Collar Crime and Victimization (3 Credits)
History, definitions, categories and trends of white collar crime, within the US and globally. The corporation as offender and the corporation as victim; Data sources and measurement; Theories of offending and victimization; Costs of crime, correlates of crime, and risks; Internal compliance systems; Enforcement strategies (deterrence/compliance); responsive regulation; enforcement pyramid; Policy assessment.

BERC602 Accounting and Its Uses in the Forensic Process (3 Credits)
An introduction to accounting for the uninitiated (an introduction to bookkeeping, key accounts, financial statements and their composition, and concepts in managerial accounting). Principles of forensic accounting and the use of financial statement analysis in the forensic process (common fraud schemes in the areas of fraudulent financial reporting, misappropriation of resources, corruption and illegal acts, how fraud schemes typically appear in the accounting records and financial statements of an enterprise or agency, the use of financial statement analysis and analytics to detect fraud, differences between a routine financial statement audit and a forensic audit, the limitations on financial statement audits in the discovery of fraud, how budgeting issues in managerial accounting can pressure managers to act unethically or illegally).

BERC603 Investigative tools and Data Analysis (3 Credits)
Techniques to electronically capture and integrate data from a variety of different sources aimed to assist managerial decision-making in such areas as fraud detection. Focus on large data sets for data mining/machine learning tools for classifications (such as decision trees, neural networks, techniques to recognize patterns in the data and regression modeling and statistics to aid prediction). Learning and utilizing appropriate software (e.g., XLMiner). Computer-aided analysis techniques for detecting and investigating white-collar offenses, issues related to the collective use of digital evidence and the collection of data from electronic devices. Extensive use of case studies as examples.

BIOE - Bioengineering

BIOE404 Biomechanics (3 Credits)
Introduction to the fundamentals of biomechanics including force analysis, mechanics of deformable bodies, stress and strain, multiaxial deformations, stress analysis, and viscoelasticity. Biomechanics of soft and hard tissues.
Prerequisite: MATH246, BIOE120, ENES102, BIOE121, and BIOE241.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE411 Tissue Engineering (3 Credits)
A review of the fundamental principles involved in the design of engineered tissues and organs. Both biological and engineering fundamentals will be considered.
Prerequisite: Must have completed at least one biology course; and (BIOE120, BIOE121, BIOE241, MATH246, and MATH241). Or permission of ENGR-Fischell Department of Bioengineering department.
Recommended: BSCI330 and BIOE340.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department. Also offered as: CHBE487.
Credit Only Granted for: BIOE411 or CHBE487.

BIOE420 Bioimaging (3 Credits)
Examines the physical principles behind major biomedical imaging modalities and new ways of using images for bio-related applications.
Prerequisite: MATH246, BIOE120, BIOE121, and BIOE241.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE422 Biosystems Engineering (3 Credits)
Conservation of mass in the context of biological systems at different scales (i.e., cellular, organ, and ecosystem), life cycles such as carbon cycle, nitrogen cycle, photosynthesis, water cycle, Kreb cycle, and aerobic and anaerobic cycles as they relate to biosystem function and health.
Prerequisite: BIOE120 and BIOE121; or (BSCI170 and BSCI171); or BSCI105. And (ENME331, BIOE331, ENCE305, or BIOE332).

BIOE431 Fundamentals of Biosensor Techniques, Instrumentation, and Applications (3 Credits)
A thorough review of fundamental concepts of biosensing systems, principles of common detection methods, and modern applications of biosensors. Primarily literature driven. Students will obtain a detailed understanding of cutting-edge biosensing techniques, the instrumentation used, and the application space. Students also will develop skills in using current literature as a source of knowledge.
Prerequisite: CHEM135, PHYS260, PHYS261, BSCI330, BIOE120, BIOE121, BIOE241, and MATH246; or permission of ENGR-Fischell Department of Bioengineering department.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE432 Fundamentals of Biophotonics Imaging and Microscopy (3 Credits)
Principles and instrumentation of various biomedical optical techniques, including fluorescene and Raman spectroscopy, confocal and multi-photon microscopy, optical coherence tomography, and diffuse optical tomography. Biomedical aplications will also be discussed.
Prerequisite: PHYS270 and BIOE420.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE432, BIOE632, or BIOE689C.

BIOE437 Computer-Aided Design in Bioengineering (3 Credits)
Introduction to Computer-Aided Design (CAD). Basic CAD operations will be demonstrated in class with Creo Parametric (formerly Pro/E). Lecture topics will summarize design methodology, review best-practices in hardware development, and discuss engineering applications. The course will culminate in a student-selected project leveraging CAD.
Prerequisite: BIOE120, BIOE121, BIOE241, and MATH246; or permission of ENGR-Fischell Department of Bioengineering department.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE437, BIOE689V, ENME414, ENME272, or ENAE488D.
Formerly: BIOE689V.

BIOE453 Biomaterials (3 Credits)
Examination of the structure and function of natural biomaterials, and cell-extracellular matrix interactions. Study physical properties of synthetic biomaterials for biomedical applications. Understanding molecular level interactions between biomolecules and biomaterials to design novel biomaterials with desirable characteristics. Application of biomaterials as implants, drug delivery systems, biosensors, engineered materials such as artificial skin and bone growth scaffolds will be covered.
Prerequisite: CHEM231, MATH246, CHEM232, BIOE120, BIOE121, and BIOE241.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE453, CHBE457, or ENMA425.

BIOE456 Bioinstrumentation (3 Credits)
Study of biomedical instrumentation and biomedical equipment technology. How biomedical equipment is used to measure information from the human body. Hands-on experience with representative biomedical equipment.
Prerequisite: BIOE455.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE456 or ENBE456.
Formerly: ENBE456.

BIOE457 Biomedical Electronics & Instrumentation (4 Credits)
Students learn fundamental concepts of electronics, assembly of electronic components into functional circuits, and integration of functional electronic devices and circuits into a system. In the lab component, students will learn to assemble and evaluate circuits and systems.
Prerequisite: BIOE120, BIOE121, BIOE241, PHYS261, MATH246, and PHYS260.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE460 Biotechnology and Bioproduction (3 Credits)
Basics of recombinant DNA technology and biopharmaceutical manufacturing.
Restriction: Junior standing or higher.
Credit Only Granted for: BIOE460, BIOE468B, or ENES489Q.
Formerly: BIOE468B.

BIOE461 Synthetic Biology and Biological Engineering (3 Credits)
Students are introduce to the scientific foundation and concepts of synthetic biology and biological engineering. Current examples that apply synthetic biology to fundamental and practical challenges will be emphasized. The course will also address the societal issues of synthetic biology, and briefly examine interests to regulate research in this area.
Prerequisite: BIOE120, BIOE121, BIOE241, and MATH246; or permission of ENGR-Fischell Department of Bioengineering department.
Recommended: Completion of BSCI222 and/or BSCI330 recommended.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE489G or BIOE 461.
Formerly: BIOE489G.

BIOE468 Selected Topics in Bioengineering (3 Credits)
Selected topics in Bioengineering will be covered and taught by a variety of department faculty.
Prerequisite: BIOE120 and BIOE121.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Repeatable to: 9 credits if content differs.

BIOE471 Biological Systems Control (3 Credits)
Principles of control systems designed by biological engineers and analysis of control mechanisms found in biological organisms. Apparent control strategies used by biological systems will be covered.
Prerequisite: BIOE455.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE471 or ENBE471.
Formerly: ENBE471.

BIOE484 Engineering in Biology (3 Credits)
Engineering with biological systems, with emphasis on utilization, design, and modeling. Broad topics include differences between biological engineering and biological science; basic sciences and how they relate to biology; typical biological responses to environmental stimuli; scaling, and utilization of living things.
Prerequisite: (MATH121 or MATH141; or must have completed MATH221); and (PHYS141 or PHYS161); and must have completed CHEM103 or higher. Or permission of ENGR-Fischell Department of Bioengineering department.
Recommended: BIOE454.
Credit Only Granted for: BIOE484 or ENBE484.
Formerly: ENBE484.

BIOE485 Capstone Design I: Entrepreneurship, Regulatory Issues, and Ethics (3 Credits)
This is the first part of a two-semester senior capstone design course which covers principles involved in engineering design, design approaches, economics of design, ethics in engineering, and patent regulations. It also helps students learn team work and write design project proposals under the mentorship of a faculty advisor.
Prerequisite: 21 credits in BIOE courses.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and senior standing; and must be in Engineering: Bioengineering program.
Credit Only Granted for: BIOE485 or ENBE485.
Formerly: ENBE485.

BIOE486 Capstone Design II (3 Credits)
This is the second part of the senior capstone design course. This part is independent instruction where faculty mentoring each project team works with students to order supplies, fabricate their proposed design under BIOE485, test the design, write the report and present it to their fellow seniors and board of faculty mentors. Students are taught to convert the blue print of a design to actual device and test it.
Prerequisite: Must have completed BIOE485 in the immediately preceding semester.
Restriction: Senior standing; and must be in Engineering: Bioengineering program; and permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE486 or ENBE486.
Formerly: ENBE486.

BIOE489 Special Topics in Bioengineering (1-3 Credits)
Exploring a variety of topics with Bioengineering.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Repeatable to: 6 credits.

BIOE601 Biomolecular and Cellular Rate Processes (3 Credits)
Presentation of techniques for characterizing and manipulating non-linear biochemical reaction networks. Advanced topics to include mathematical modeling of the dynamics of biological systems; separation techniques for heat sensitive biologically active materials; and rate processes in cellular and biomolecular systems. Methods are applied to current biotechnological systems, some include: recombinant bacteria; plant insect and mammalian cells; and transformed cell lines.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE601 or ENCH859B.

BIOE602 Cellular and Tissue Biomechanics (3 Credits)
Introduction to the fundamentals of biomechanics including force analysis, mechanics of deformable bodies, stress and strain, multiaxial deformations, stress analysis, and viscoelasticity. Biomechanics of soft and hard tissues.

BIOE604 Cellular and Physiological Transport Phenomena (3 Credits)
A study of transport processes, including momentum, energy and mass transport, relevant to biosystems at various scales from physiological to cellular systems. Transport leads to sets of partial differential equations and the course revolves around approaches to solving these equations to arrive at fundamental understanding of the physics of transport in biosystems.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE605 BIOE Graduate Studies I (1 Credit)
Introduction to the bioengineering graduate program. Students gain exposure to departmental research through lab rotation and to current research in the field through seminar. Students will also gain preparation and guidance on other first-year academic requirements.
Restriction: Must be in ENGR: PhD Only-Bioengineering (Doctoral) program.

BIOE606 BIOE Graduate Studies II (1 Credit)
Second semester continued acclimation to the bioengineering graduate program. Students gain exposure to departmental research through lab rotation and to current research in the field through seminar.
Restriction: Must be in ENGR: PhD Only-Bioengineering (Doctoral) program.

BIOE608 Bioengineering Seminar Series (1 Credit)
A variety of topics related to Bioengineering will be presented in weekly seminars.
Restriction: Must be in one of the following programs (ENGR: PhD Only-Bioengineering (Master's); ENGR: PhD Only-Bioengineering (Doctoral)).
Repeatable to: 6 credits if content differs.

BIOE611 Advanced Tissue Engineering (3 Credits)
A review of the fundamental principles involved in the design of engineered tissues and organs. Both biological and engineering fundamentals will be considered.
Prerequisite: Must have completed at least one biology course; and MATH241. Or permission of ENGR-Fischell Department of Bioengineering department.
Recommended: BSCI330 and BIOE340.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE612 Physiological Evaluation of Bioengineering Designs (3 Credits)
Bioengineering designs of biomaterials, biomedical devices, imaging and drug delivery agents, tissue engineering, prosthesis (among others), offer the opportunity to improve health care. This course is aimed at providing knowledge to lead bioengineering designs on the basis of biocompatibility and to provide tools to assess their patho-physiological impact in biological systems.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE614 Computational Molecular Bioengineering (3 Credits)
Introduction to the principles, methods and software used for simulation and modeling of macromolecules of biological interest. Along with experiment and theory, computational modeling provides new tools for analysis, explanation and prediction.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE689D or BIOE614.
Formerly: BIOE689D.

BIOE631 Biosensor Techniques, Instrumentation, and Applications (3 Credits)
A thorough review of fundamental concepts of biosensing systems, principles of common detection methods, and modern applications of biosensors. Primarily literature driven. Students will obtain a detailed understanding of cutting-edge biosensing techniques, the instrumentation used, and the application space. Students also will develop skills in using current literature as a source of knowledge.
Prerequisite: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE631, BIOE689Z, or CHPH718Z.
Formerly: BIOE689Z.

BIOE632 Biophotonic Imaging and Microscopy (3 Credits)
Principles and instrumentation of various biomedical optical techniques, including fluorescene and Raman spectroscopy, confocal and multi-photon microscopy, optical coherence tomography, and diffuse optical tomography. Biomedical aplications will also be discussed.
Recommended: BIOE420.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE432, BIOE632, or BIOE689C.

BIOE640 Polymer Physics (3 Credits)
Graduate course covering theoretical aspects of the behavior of polymeric materials. It covers statistical properties and thermodynamics of single chain and multichain systems.
Prerequisite: ENMA471; or permission of instructor. Also offered as: ENMA620.
Credit Only Granted for: ENMA620 or BIOE640.

BIOE645 Advanced Engineering Start Up Ventures (3 Credits)
Covers principles and practices important to engineering startup ventures, especially those involving bioengineering and medical device enterprises, and includes the preparation of business plans and tools used to obtain funding.

BIOE650 Quantitative Physiology of the Cell (3 Credits)
Introduction to quatitative aspects of neuronal, skeletal muscle, and cardiac physiological systems, with an emphasis on cellular function and plasticity. Complements BIOE603: Electrophysiolgy of the Cell.
Recommended: MATH246, MATH141, and MATH241.
Credit Only Granted for: BIOE689Q or BIOE650.
Formerly: BIOE689Q.

BIOE653 Advanced Biomaterials (3 Credits)
Examine the relationship between structure and function of biomaterials. Study physical properties of synthetic and natural biomaterials. Understand molecular level interactions between biomolecules and biomaterials to design novel biomaterials with desirable characteristics. Application of biomaterials as implants, drug delivery systems, biosensors, and scaffold materials for tissue engineering will be covered.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department. Also offered as: ENMA625.
Credit Only Granted for: ENMA625 or BIOE653.

BIOE689 Special Topics in Bioengineering (1-3 Credits)
Research Oriented Individual Instruction course.
Repeatable to: 6 credits if content differs.

BIOE799 Master's Thesis Research (1-6 Credits)

BIOE898 Pre-Candidacy Research (1-8 Credits)

BIOE899 Doctoral Dissertation Research (1-8 Credits)

BIOL - Biology

BIOL600 Ethics in Scientific Research (2 Credits)
Issues of sceintific integrity with emphasis on investigators in the laboratory sciences, including mentoring, scientific record keeping, authorship and peer review, ownership of data, use of animals and humans in research, and conflict of interest.
Restriction: Must have completed at least one year of graduate study.
Credit Only Granted for: BIOL600 or ZOOL600.
Formerly: ZOOL600.

BIOL608 Biology Seminar (1-2 Credits)

BIOL609 Special Problems in Biology (1-6 Credits)
One seminar per week for each subject selected: A-Cell Biology; B-Developmental Biology; C-Estuarine and Marine Biology; D-Genetics; E-Parasitology; F-Physiology; G-Systematics and Evolutionary Biology; I-Behavior; J-General; K-Endocrinology; L-Ecology.
Repeatable to: 6 credits if content differs.
Formerly: ZOOL609.

BIOL613 Recombinant DNA (3 Credits)
An advanced course presenting the tools and procedures of genetic engineering. Theory and practical applications of recombinant DNA techniques to understanding eukaryotic gene structure and expression.
Prerequisite: BSCI330 or BSCI230; and BSCI222. Or permission of instructor required.
Credit Only Granted for: BIOL613 or ZOOL652.
Formerly: ZOOL652.

BIOL615 Developmental Genetics (3 Credits)
Differential gene function and its regulation in developing systems. Genes and the analysis of developmental processes.
Prerequisite: Must have completed courses in molecular genetics and developmental or cell biology; or permission of instructor.
Credit Only Granted for: BIOL615 or ZOOL642.
Formerly: ZOOL642.

BIOL620 Cell Biology (3 Credits)
Offered with laboratory as BSCI 421. Molecular basis of cell structure and function in eukaryotes.

BIOL622 Membrane Transport Phenomena (3 Credits)
The fundamental phenomena related to solute movement in bulk solution and across interfaces. Examination of natural and artificial membrane transport systems, with emphasis placed on their mechanism of action.
Prerequisite: (MATH120; or must have completed MATH220); and (BSCI330 or BSCI230). Or permission of instructor.
Credit Only Granted for: BIOL622 or ZOOL622.
Formerly: ZOOL622.

BIOL625 Biological Ultrastructure (3 Credits)
The ultrastructure of cells and tissues, with emphasis on interpretation and correlation of ultrastructure and function.
Prerequisite: Must have completed a course in Cell Biology or Histology; or permission of instructor.
Credit Only Granted for: BIOL625 or ZOOL615.
Formerly: ZOOL615.

BIOL641 Comparative Physiology (4 Credits)
Cellular and biochemical processes used by animals to interact with both the external and cellular environment. Water balance, intermediary metabolism, nitrogen metabolism, anaerobic metabolism, thermal regulation, nerve and muscle physiology in cells from a broad variety of animal species are considered.
Prerequisite: One year of biology, one year of organic chemistry, and one semester of physiology.
Credit Only Granted for: BIOL641 or ZOOL621.
Formerly: ZOOL621.

BIOL646 Hearing (3 Credits)
Principles of hearing, covering the auditory periphery, the physiology and anatomy of the central auditory system and psychoacoustics.
Prerequisite: BSCI330 or BSCI230; or permission of instructor.

BIOL660 Theoretical Population and Community Ecology (3 Credits)
Application of simple dynamic systems and optimization models to understand the dynamics of populations and ecological communities; population growth, predator-prey interactions, competition, food webs, foraging theory, and evolution of life histories. Instruction and use of the program Mathematica.
Prerequisite: Must have completed one year of college calculus. And BSCI462; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: BIOL660 or ZOOL675.
Formerly: ZOOL675.

BIOL667 Mathematical Biology (4 Credits)
Mathematical methods of analyzing deterministic and stochastic biological processes from a variety of areas (including population and evolutionary biology, neurobiology, physiology, and morphogenesis). Qualitative aspects of dynamical systems which are usually given as difference or differential equations. The computer program Mathematica will be used to obtain the numerical solutions of these equations.
Credit Only Granted for: BIOL667 or ZOOL625.
Formerly: ZOOL625.

BIOL671 Molecular Evolution (3 Credits)
Basic foundations through advanced concepts in molecular evolution, including patterns and processes of DNA sequence variation, transposable element dynamics, gene duplication and loss, and genome organization. Relevant concepts from genetics, biochemistry, and phylogenetics also will be covered.
Credit Only Granted for: BIOL671 or ZOOL645.
Formerly: ZOOL645.

BIOL701 Teaching Biology (1 Credit)
Introduction to instructional methods and strategies, University and College policies, and campus resources for new LFSC graduate teaching assistants.
Credit Only Granted for: BIOL701 or ZOOL701.
Formerly: ZOOL701.

BIOL704 Cell Biology from a Biophysical Perspective (3 Credits)
An approach to cell biology by focusing on mechanisms and unifying paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think quantitatively and mechanistically.
Recommended: BSCI330, PHYS121, and PHYS122. Also offered as: BSCI404.
Credit Only Granted for: BSCI404, BIOL704, BIOL708O, or BIPH704.
Formerly: BIOL708O.

BIOL705 Statistics & Modeling for Biologists (3 Credits)
An overview of essential probability and statistics using R with a focus on biological problems. Topics include: parameter estimation (likelihood, Bayesian), confidence intervals and hypothesis testing, multiple testing, experimental design and power analysis, and resampling-based measures of uncertainty. Practical use of computers will be emphasized.
Credit Only Granted for: BIOL705 or BIOL709F.
Formerly: BIOL709F.

BIOL708 Advanced Topics in Biology (1-4 Credits)
Lectures, experimental courses and other special instructions in various zoological subjects.
Repeatable to: 8 credits if content differs.
Credit Only Granted for: BIOL708 or ZOOL708.
Formerly: ZOOL708.

BIOL709 Selected Advanced Topics in Biology (1-4 Credits)
Lectures, experimental courses and other special instructions in various biological subjects.
Repeatable to: 16 credits.

BIOL710 Plant Ecological Genetics (3 Credits)
Plant ecological genetics is focused on the processes responsible for evolution in plant populations. Covers the basic principle of population genetics, then quickly shifts towards understanding how allele frequencies can change in an ecological context. Emphasis is placed on the role of drift and selection in evolution, and particular attention is placed on plant mating system evolution.
Prerequisite: BSCI472 and BSCI222; or permission of instructor.
Credit Only Granted for: BIOL710 or PBIO745.
Formerly: PBIO745.

BIOL744 Neurophysiology (3 Credits)
The physiology of nerves, muscles, an sensory receptors, and aspects of central nervous system physiology.
Prerequisite: PHYS122.

BIOL762 Physiological Plant Ecology (2 Credits)
Environmental effects on plant ecophysiology. Microclimatology, leaf energy balance, plant responses to temperature and radiation, physiological adaptations, water relations and plant gas exchange.
Prerequisite: BSCI460; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: BIOL762 or PBIO755.
Formerly: PBIO755.

BIOL765 Sociobiology (4 Credits)
Deals with the description and analysis of animal social organizations the adaptive nature of animal societies, the effects of early experience, and the role of communication in the integration of animal groups.
Prerequisite: Must have completed a course in behavior.
Restriction: Permission of instructor.
Credit Only Granted for: BIOL765 or ZOOL665.
Formerly: ZOOL665.

BIOL767 Behavioral Endocrinology (3 Credits)
The interactive effects of hormones and behavior. Emphasis on the reproductive and stress hormones as they affect the brain and behavior.
Prerequisite: BSCI342 or BSCI447.
Credit Only Granted for: BIOL767 or ZOOL627.
Formerly: ZOOL627.

BIOL799 Master's Thesis Research (1-6 Credits)

BIOL898 Pre-Candidacy Research (1-8 Credits)

BIOL899 Doctoral Dissertation Research (1-8 Credits)

BIOM - Biometrics

BIOM405 Computer Applications in Biometrics (1 Credit)
An introduction to computer applications for data analysis. This is equivalent to the computer lab of 601 and is required for students that have taken BIOM 301 and BIOM402 and wish to go directly into BIOM602.

BIOM601 Biostatistics I (4 Credits)
Estimation and hypothesis testing, t tests, one and two way analysis of variance, regression, analysis of frequency data. Lecture will emphasize uses and limitations of these methods in biology, while the laboratory will emphasize the use of statistical analysis software for the analysis of biological data.
Prerequisite: BIOM301 or STAT464; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: BIOM401 or BIOM601.

BIOM602 Biostatistics II (4 Credits)
The principles of experimental design and analysis of variance and covariance.
Prerequisite: BIOM601 or BIOM405.

BIOM603 Biostatistics III (4 Credits)
Applications and implementation of linear model analysis to biological data, including multivariate regression model, mixed model, generalized linear mixed model, nonlinear logistic and Poisson regression models, power calculation and survival analysis.
Prerequisite: Must have completed a graduate-level statistical class; or students who have taken courses with comparable content may contact the department.

BIOM621 Applied Multivariate Statistics (3 Credits)
Brief review of matrix algebra, means, covariance matrices, multivariate normal, multivariate confidence ellipses, MANOVA, Discriminant Methods, Principal Component Analysis, Factor Analysis, Multidimensional Scaling, Cluster Analyses, and other topics, depending on student interest.
Prerequisite: BIOM602.
Recommended: BIOM603.

BIOM688 Topics in Biometrics (1-3 Credits)
Advanced topics of current interest in various areas of biometrics. Credit assigned will depend on lecture and/or laboratory time scheduled and organization of the course.
Restriction: Permission of AGNR-Animal & Avian Sciences department.
Repeatable to: 6 credits if content differs.

BIOM698 Special Problems in Biometrics (1-3 Credits)
Individual study of a particular topic in biostatistics or biomathematics.
Restriction: Permission of AGNR-Animal & Avian Sciences department; and permission of instructor.
Repeatable to: 6 credits if content differs.

BIOM699 Seminar in Biometrics (1 Credit)

BIPH - Biophysics

BIPH698 Biophysics Seminar (1 Credit)

BIPH699 Research in Biophysics (2 Credits)
Supervised research in biophysics laboratories. Rotations through several laboratories prior to a choice of laboratory for a research assistantship.
Restriction: Must be in one of the following programs (Biophysics (Master's); Biophysics (Doctoral)).
Repeatable to: 8 credits if content differs.

BIPH704 Cell Biology from a Biophysical Perspective (3 Credits)
An approach to cell biology by focusing on mechanisms and unifying paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think quantitatively and mechanistically.
Recommended: BSCI330, PHYS121, and PHYS122. Also offered as: BSCI404, BIOL704.
Credit Only Granted for: BSCI404, BIOL704, BIOL708O, or BIPH704.

BIPH799 Master's Thesis Research (1-6 Credits)

BIPH898 Pre-Candidacy Research (1-8 Credits)

BIPH899 Doctoral Dissertation Research (1-8 Credits)

BISI - Biological Sciences

BISI701 Teaching & Professional Development in Biology (1 Credit)
Provides graduate students in the biological sciences with the foundational knowledge to become better teaching assistants and gives them an introduction into the skills and tools that they need to develop as professional scientists and educators.Also offered as: ENTM701.
Credit Only Granted for: ENTM701, BISI688Z, CBMG688Z, or BIOL701.
Formerly: BISI688Z, CBMG688Z, BIOL701.
Additional Information: Priority in enrollment will be given to students in the BISI Graduate Program.

BISI708 Advanced Topics in Biological Sciences (1-3 Credits)
Lectures, experimental courses, and other special instructions in various areas of biological sciences.
Repeatable to: 8 credits if content differs.

BISI712 Responsible Conduct of Research for Biologists (1 Credit)
An exploration of the ethical dimensions associated with the responsible conduct of scientific research focusing on providing students with practical insights into the existing norms and expectations of working scientists.
Credit Only Granted for: BISI712, BISI688B, or CBMG688B.
Formerly: BISI688B and CBMG688B.

BISI799 Master's Thesis Research (1-6 Credits)

BISI898 Pre-Candidacy Research (1-8 Credits)

BISI899 Doctoral Dissertation Research (1-8 Credits)

BMGT - Business and Management

BMGT402 Database Systems (3 Credits)
The fundamentals of database management systems (DBMS), data models, query processing, and data warehouses, and their application in the development of business information systems will be covered. An important goal of this course is to understand the value of information resources and information management challenges within an organization.
Recommended: BMGT302.
Credit Only Granted for: INST327 or BMGT402.

BMGT403 Systems Analysis and Design (3 Credits)
Techniques and tools applicable to the analysis and design of computer-based information systems. System life cycle, requirements analysis, logical design of databases and performance evaluation. Emphasis on case studies. Project required that involves the design, analysis and implementation of an information system.
Prerequisite: BMGT301; or students who have taken courses with comparable content may contact the department.
Recommended: BMGT302.

BMGT404 Essential Data Skills for Business Analytics (3 Credits)
Understand the principles of data science and business analytics to collect, analyze and visualize business data. Students will learn the use of industry standard software with applications in finance, accounting, marketing and operations.
Prerequisite: BMGT301.

BMGT405 Data Communications and Networking (3 Credits)
Concepts of business data communications and data processing. Application of these ideas in computer networks, including basic principles of telecommunications technology, computer network technology, data management in distributed database systems and management of the technical and functional components of telecommunications technology.
Prerequisite: BMGT301; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: INST346 or BMGT405.

BMGT406 Developing Applications for the Web and Social Media (3 Credits)
The design and development of Web applications and the underlying platforms and standards for Web application development will be covered. It will examine the phenomenon of social media, social networking and crowdsourcing and understand their use within organizations.
Prerequisite: BMGT402 and BMGT302.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Credit Only Granted for: INST377 or BMGT406.

BMGT407 Information Systems Projects (3 Credits)
Senior capstone course for the decision and information sciences major. Collected knowledge from the DIS courses and application to significant problems of size and complexity. State-of-the-art research ideas and current business and industrial practices in information systems.
Prerequisite: BMGT402 and BMGT403.
Restriction: Senior standing.

BMGT408 Emerging Topics in Information Systems (3 Credits)
Selected advanced topics covering emerging developments in the field of decision and information technologies.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.

BMGT410 Government Accounting (3 Credits)
An introduction to the theory and practice of accounting and financial reporting as applied in both federal and state/local governments, with a focus on generally accepted accounting principles applicable in each. Topics include analyzing transactions; recognizing transactions in the accounting cycles; and preparing and analyzing financial statements and the overall financial reports at both the federal and state/local government levels.
Prerequisite: BMGT221.

BMGT411 Ethics and Professionalism in Accounting (3 Credits)
Analysis and discussion of issues relating to ethics and professionalism in accounting.
Prerequisite: BMGT311.
Restriction: Must be in Accounting program.

BMGT417 Taxation of Corporations, Partnerships and Estates (3 Credits)
Federal taxation of corporations using the life-cycle approach-formation, operation, assessment, merger, reorganization and liquidation. Overviews of pass-through entities - partnerships and s-corporations -using the life-cycle approach, and the tax consequences of wealth transfers by individuals - gift and estate taxation. Both tax planning and compliance issues are addressed.
Prerequisite: BMGT221.

BMGT422 Auditing Theory and Practice (3 Credits)
A study of the independent accountant's attest function, generally accepted auditing standards, compliance and substantive tests and report forms and opinions.
Prerequisite: BMGT310; and must have completed or be concurrently enrolled in BMGT311.

BMGT423 Fraud Examination (3 Credits)
Covers fraud prevention, detection and investigation techniques. The traditional accounting areas of fraud-fraudulent financial accounting and misappropriation of assets as well as recent and historical cases of fraud will also be examined. Current fraud topics will be discussed.
Prerequisite: BMGT310.

BMGT424 Advanced Accounting (3 Credits)
Advanced accounting theory applied to specialized topics and current problems. Emphasis on consolidated statements and partnership accounting.
Prerequisite: BMGT311.

BMGT428 Special Topics in Accounting (3 Credits)
Selected advanced topics in Accounting.
Prerequisite: BMGT310.
Restriction: Must be in Accounting program.
Repeatable to: 9 credits if content differs.

BMGT430 Data Modeling in Business (3 Credits)
Explores the role of statistical models in business analytics to drive managerial decision-making and improve performance through the use of relevant data-motivated examples. Topics include regression models (both simple and multiple regression, as well as logistic regression for binary data), model validation, variable transformation, variable selection, discriminant analysis, and forecasting. These topics are modeled using state-of-the-art data analytics software.
Prerequisite: BMGT231 or BMGT230; or permission of BMGT-Robert H. Smith School of Business.

BMGT431 Data Analytics (3 Credits)
An introduction to the tools and techniques that are central to the analysis of abundant data that is being collected in many forms including web traffic, social network data, and reviews and comments on websites.
Prerequisite: BMGT430.

BMGT434 Analytics Consulting: Cases and Projects (3 Credits)
This course assumes that students have already been introduced to the concepts and techniques of operations research/business analytics (OR/BA). Published papers, short cases, and projects in OR/BA will be analyzed and discussed in a thoughtful way, taking into account the soft (people-related) issues and the hard (mathematical/optimization) issues.
Prerequisite: BMGT332; and (MATH120 or MATH140; or must have completed MATH220). Or students who have taken courses with comparable content may contact the department.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT435 Business Process Simulation (3 Credits)
Develop and plan simulation studies, build simulation models with special purpose software, analyze and interpret the results. Extensive use of applications and real-world examples. The emphasis is on model formulation and the interpretation of results, rather than mathematical theory.
Prerequisite: BMGT231 or BMGT230; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT438 Special Topics in Operations Management (1-3 Credits)
Selected advanced topics in operations management.
Repeatable to: 6 credits if content differs.

BMGT440 Advanced Financial Management (3 Credits)
Analysis and discussion of cases and readings relating to financial decisions of the firm. The application of finance concepts to the solution of financial problems is emphasized.
Prerequisite: BMGT340.

BMGT441 Fixed Income (3 Credits)
Describes important financial instruments which have market values that are sensitive to interest rate movements. Develops tools to analyze interest rate sensitivity and value fixed income securities. Defines and explains the vocabulary of the bond management business.
Prerequisite: BMGT340.
Credit Only Granted for: BMGT448A or BMGT441.
Formerly: BMGT448A.

BMGT442 Advanced Portfolio Management (3 Credits)
An in-depth coverage of statistical methods for choosing stocks is provided. Financial markets data is used in the class. Students are also expected to learn and use Matlab during the class to implement the concepts of the class.
Prerequisite: BMGT343.
Credit Only Granted for: BMGT442 or BMGT448C.
Formerly: BMGT448C.

BMGT443 Applied Equity Analysis and Portfolio Management (3 Credits)
Study and application of the concepts, methods, models, and empirical findings to the analysis, valuation and selection of securities, especially common stock.
Prerequisite: BMGT343.

BMGT444 Futures and Options Contracts (3 Credits)
The institutional features and economic rationale underlying markets in futures and options. Hedging, speculation, structure of futures prices, interest rate futures, efficiency in futures markets and stock and commodity options.
Prerequisite: BMGT343.
Credit Only Granted for: BMGT444 or MATH424.

BMGT445 Banking and Financial Institutions (3 Credits)
Analysis and discussion of cases and readings in commercial bank management. The loan function is emphasized; also the management of liquidity reserves, investments for income and source of funds. Bank objectives, functions, policies, organization, structure, services and regulation are considered.
Prerequisite: BMGT340.
Recommended: ECON330 or BMGT341.

BMGT446 International Finance (3 Credits)
Financial management from the perspective of the multinational corporation. Topics covered include the organization and functions of foreign exchange and international capital markets, international capital budgeting, financing foreign trade and designing a global financing strategy. Emphasis of the course is on how to manage exchange and political risks while maximizing benefits from global opportunity sets faced by the firm.
Prerequisite: BMGT340.

BMGT447 Computational Finance (3 Credits)
Students will be introduced to tools for solving financial problems, specifically Excel functions and techniques, Visual Basic (VBA) Programming and Monte Carlo method & variations. Students will then apply these tools to solve problems related to options valuation, portfolio management, and risk management.
Prerequisite: BMGT343.
Credit Only Granted for: BMGT447 or BMGT448E.
Formerly: BMGT448E.

BMGT448 Special Topics in Finance (1-3 Credits)
Selected advanced topics in finance.
Repeatable to: 9 credits if content differs.

BMGT449 Investment Fund Management: Lemma Senbet Fund (3 Credits)
The Lemma Senbet Fund is a year-long, advanced finance course available to undergraduate finance majors in their senior year. Ten to twelve students will be selected in the spring of their junior year to participate on the fund, two as portfolio managers and eight to ten as equity analysts. The course provides students with the opportunity to apply what they have learned in finance classes to actual investment decisions, through researching real companies and managing a portfolio of real money.
Prerequisite: BMGT343.
Corequisite: BMGT443.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 6 credits if content differs.

BMGT450 Integrated Marketing Communications (3 Credits)
In-depth study of coordinated marketing activities including advertising, sales promotion, Internet marketing, direct marketing and personal selling. Emphasizes strategic planning to effectively use these promotional tools to communicate with customers and meet marketing goals. Blends theory and current practice to provide managerial orientation.
Prerequisite: BMGT350.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT354 or BMGT450.
Formerly: BMGT354.

BMGT451 Consumer Analysis (3 Credits)
Identifying buyer behavior concepts relevant to a specific marketing problem so that appropriate marketing decisions can be made. Conceptual frameworks are drawn from psychology, sociology, economics, and other social sciences to aid in understanding the behavior of ultimate and industrial buyers.
Prerequisite: BMGT350.
Recommended: PSYC100; and PSYC221.

BMGT452 Marketing Research Methods (3 Credits)
Focuses on aiding marketing decision-making through exploratory, descriptive and casual research. Develops student skills in designing market research studies, including selection of data collection method, development of data collection instrument, sample design, collection and statistical analysis of data and reporting the results.
Prerequisite: BMGT350 and BMGT230.

BMGT454 Global Marketing (3 Credits)
Marketing functions from the global executive's viewpoint, including coverage of global marketing policies relating to product adaptation, data collection and analysis, channels of distribution, pricing, communications and cost analysis. Consideration is given to the cultural, legal, financial and organizational aspects of global marketing.
Prerequisite: BMGT350.

BMGT455 Sales Management (3 Credits)
The roles of the sales executive as a planner, manager of resources and marketing functions and recruiter, trainer, motivator and leader of field sales personnel. Techniques and sequence of problem analysis for selling and sales management decisions and to the practical framework in which these decisions take place. Teaching vehicles feature strong classroom interactions, cases, journal articles, research findings, guest sales managers, debates, and modern company practices.
Prerequisite: BMGT350.

BMGT457 Marketing Policies and Strategies (3 Credits)
This capstone course ties together various marketing concepts using the fundamentals of strategic market planning as the framework. Application of these principles is accomplished by analyzing and discussing cases and by playing a marketing strategy computer simulation game. Analysis of current business articles to understand the link between theory and real-world problem solving.
Prerequisite: BMGT350.

BMGT458 Special Topics in Marketing (1-3 Credits)
Selected advanced topics in marketing.
Repeatable to: 6 credits if content differs.

BMGT461 Entrepreneurship (3 Credits)
Process of creating new ventures, including evaluating the entrepreneurial team, the opportunity and the financing requirements. Skills, concepts, mental attitudes and knowledge relevant for starting a new business.
Restriction: Must not have completed BMGT361.
Credit Only Granted for: BMGT261, BMGT361, BMGT461, ENES460 or HLMN470.

BMGT463 Cross-cultural Challenges in Business (3 Credits)
Examines in depth the nature of international cultural value-differences and their behavioral-related effects in the workplace. Topics include decision-making and leadership styles and reactions to various work assignments and reward structures.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT465 Business Plan For The New Venture (3 Credits)
Each student focuses on the production of a business plan that will be accepted for an annual business plan competition. Business plans of sufficient quality may be submitted to attract financing. Topics include a deep review of business construction and its derivative short forms.
Prerequisite: BMGT461 or BMGT361.

BMGT466 Global Business Strategy (3 Credits)
Focuses on the strategic challenges that directly result from and are associated with the globalization of industries and companies. Topics include drivers of industry globalization, difference between global and multi-domestic industry, global expansion strategies, sources of competitive advantage in a global context, and coordination of a company across a global network.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT467 Strategic Innovation and Entrepreneurship (3 Credits)
Provides an understanding of how innovation affects the competitive dynamics of markets, how firms can strategically manage innovation, and how firms can create and implement strategies to maximize their likelihood of success.
Credit Only Granted for: BMGT467, ENES463 or HLMN472.

BMGT468 Special Topics in Management and Organization (1-3 Credits)
Selected advanced topics in management and organization.
Repeatable to: 6 credits if content differs.

BMGT469 Management and Organization Short-term Study Abroad (3 Credits)
Selected short-term study abroad topics in management and organization.
Repeatable to: 9 credits if content differs.

BMGT470 Carrier Management (3 Credits)
The study of the wide range of issues facing managers in transportation. This includes decisions on market entry, pricing, competitive responses, service levels, marketing strategies, capital structure, and growth objectives. Specific management decisions and overall strategies pursued by management are examined.
Prerequisite: BMGT370.

BMGT471 Seminar in Supply Chain Management: An Executive Perspective (3 Credits)
Designed to provide students intensive interaction with senior supply chain executives from a cross-section of industries. Executives will share their insights about leading competitive supply chains in the global marketplace and assist students in understanding how to develop supply chain career strategies. Students will research the competitive supply chain dynamics of each executive's industry and review/analyze their findings with the executive.
Prerequisite: BMGT372.
Formerly: BMGT488L and BMGT498L.

BMGT472 Purchasing and Inbound Logistics (3 Credits)
Analysis of the resupply activities of logistics management, including purchasing policies, transportation planning, and inventory control. Attention is directed toward total cost minimization and the establishment of a sustainable competitive advantage based on procurement.
Prerequisite: BMGT372.

BMGT476 Technology Applications in Supply Chain Management (3 Credits)
An understanding of the role of technology in managing the supply chain. Provides students with hands-on experience in advanced software systems that build on top of enterprise resource planning systems. Major emphasis is placed on demonstrating that these systems result in supply chain cost reductions and service improvements.
Prerequisite: BMGT372.

BMGT477 International Supply Chain Management (3 Credits)
The study of the importance of the supply chain management within a global context. Topics covered include: the structure, service, pricing and competitive relationships among international carriers and transport intermediaries as well as documentation, location decisions, international sourcing/distribution and management of inventory throughout the international supply chain.

BMGT478 Special Topics in Supply Chain Management (3 Credits)
Selected advanced topics in supply chain management.
Repeatable to: 9 credits if content differs.
Additional Information: Course prerequisites will vary depending on the topic. A maximum of 3 credits of BMGT478 course work can fulfill Supply Chain Management major requirements.

BMGT484 Digital Marketing (3 Credits)
Examines the process of developing, implementing, and analyzing strategies for successfully marketing a variety of existing and potential products and services through digital means, including the web, social media, and mobile apps. Both the development and analysis of digital media for marketing will be discussed.
Prerequisite: BMGT350.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT485 Project Management (3 Credits)
Modern project management techniques that are used by modern practicing professionals will be covered. Particular attention is given to the management of technology based systems and projects in a business enterprise. The topics covered include: defining project scope, alignment of projects with enterprise strategy, managing project cost, time and risks using tools such as CPM/PERT, and measuring project performance.
Prerequisite: BMGT231 or BMGT230; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT487 Six Sigma Innovation (3 Credits)
Enhances the overall understanding of Six Sigma Strategy, Tools and Methods to positively influence the performance of a business process, a product or service. Highlights the application of Define-Measure-Analyze-Improve-Control (DMAIC),Design For Six Sigma (DFSS), and the pursuit of Critical to Quality criteria (CTQ's) in a collaborative perspective, one that recognizes a balance between efficiency, and effectiveness and between statistical analysis and statistical thinking.
Prerequisite: STAT400, BMGT231, BMGT230, or ENME392.

BMGT488 Special Topics in Logistics, Business, and Public Policy (1-3 Credits)
Selected advanced topics in logistics, business and public policy.
Repeatable to: 6 credits if content differs.

BMGT490 Quest Consulting and Innovation Practicum (4 Credits)
Final course in the QUEST Honors Fellows Program three-course curriculum. Based on a team-based consulting project with one of QUEST's professional partners. A project advisor and professional champion supervise each student team. Requires extensive out-of-class work.
Prerequisite: ENES390 or BMGT390. Also offered as: ENES490.
Credit Only Granted for: BMGT490 or ENES490.

BMGT491 Defining Consulting and Innovation Projects (3 Credits)
Cultivate relationships with new and current corporate partners and prepare project scopes for QUEST's capstone course, BMGT/ENES 490H. Requires independent work communicating with clients and class visits to a variety of potential project sites.
Prerequisite: BMGT190 or ENES190.
Restriction: Restricted to QUEST Program (TQMP) students. Also offered as: ENES491.
Credit Only Granted for: BMGT491, ENES491 or BMGT438D.
Formerly: BMGT438D.

BMGT493 Honors Study (3 Credits)
First semester of the senior year. The course is designed for honors students who have elected to conduct intensive study (independent or group). The student will work under the direct guidance of a faculty advisor and the Assistant Dean of Undergraduate Studies. They shall determine that the area of study is of a scope and intensity deserving of a candidate's attention. Formal written and/or oral reports on the study may be required by the faculty advisor.
Restriction: Permission of BMGT-Robert H. Smith School of Business.

BMGT494 Honors Study (3 Credits)
Second semester of the senior year. The student shall continue and complete the research initiated in BMGT 493, additional reports may be required at the discretion of the faculty advisor and Assistant Dean of Undergraduate Studies.
Prerequisite: BMGT493.
Restriction: Permission of BMGT-Robert H. Smith School of Business; and must be in the Smith School Honors Fellows program.

BMGT495 Strategic Management (3 Credits)
A case-based course where students learn to play the role of the "strategic manager" who defines the scope of its business operations and, within the chosen scope, how the firm will compete against rivals. This course focuses on how a firm can both formulate effective business-level and corporate-level strategies to achieve competitive advantage and earn above average profits.

BMGT496 Business Ethics and Society (3 Credits)
A study of the standards of business conduct, morals and values as well as the role of business in society with consideration of the sometimes conflicting interests of and claims on the firm and its objectives. Emphasizes a strategic approach by business to the management of its external environment.
Prerequisite: 1 course in BMGT; or permission of BMGT-Robert H. Smith School of Business.

BMGT497 Strategic Management for Non Business Majors (2 Credits)
Focuses on how a firm can both formulate and implement effective business-level and corporate-level strategies to achieve competitive advantage and earn above average profits
Restriction: Must be admitted to the Minor in General Business or the Minor in Innovation and Entrepreneurship; and must not be a major in the R.H. Smith School of Business.
Additional Information: Course does not apply toward a Smith School degree.

BMGT498 Special Topics in Business and Management (3 Credits)
Special topics in business and management designed to meet the changing needs and interests of students and faculty.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 6 credits if content differs.

BMGT499 Advanced Business Topics (1 Credit)
Course will delve deeply into a specific business topic. Based on experience and knowledge from undergraduate core business classes, students will examine a particular subject from various angles.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Repeatable to: 3 credits if content differs.

BMGT600 Leadership and Teamwork (2 Credits)
Course examines concepts of team-building and leadership which are critical to managerial success. Topics include leadership, decision making, communication and conflict, work motivation, building effective teams, and organizational change and culture.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BMGT600, BUSI662 or BUSM600.

BMGT606 Data Driven Decision Making (2 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI630 or BMGT606.

BMGT612 Marketing Management (2 Credits)
Analysis of marketing problems and evaluation of specific marketing efforts regarding the organization's products and services, pricing activities, channel selection, and promotion strategies in both domestic and international markets.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI650 or BMGT612.

BMGT614 Strategic Management (2 Credits)
Analyze and identify profit opportunities and threats in different industry and competitive environments; Analyze and identify a firm's valuable assets, resources and capabilities and how they might be protected, leveraged, and extended in the market; Learn how to organize your company to be the best prepared to adapt its strategy over time as the market environment changes; and how to use organic growth as well as mergers, acquisitions, joint ventures, alliances, and divestitures to ensure that the firm maintians the proper scale and scope to compete effectively over time.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI690 or BMGT614.

BMGT616 Managerial Accounting (2 Credits)
Use of accounting data in corporate planning and control. Cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI611, BUSI616, or BMGT616.

BMGT624 Operations Management (2 Credits)
Operations management is concerned with efficient and effective design and operation of business processes for delivering products and/or services. Emphasis is given to process analysis and design, capacity management and bottlenecks, waiting lines and the impact of uncertainty in process performance, quality management, lean, six-sigma, and revenue management.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI634 or BMGT624.

BMGT700 Competitive and Collaborative Negotiation (2 Credits)
Increase negotiating self-confidence and improve capacity to achieve win-win solutions to organizational problems. Improve effectiveness at finding creative solutions to conflict.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO714 or BMGT700.

BMGT703 ICT Supply Chain Risk Management (3 Credits)
Explores methods to build ICT Supply Chain Risk Management (SCRM) capability from multiple perspectives: -From the perspective of the cyber supply chain planner who has to assess strategic & operational ICT risks on a system-wide basis. -From the perspective of the cyber supply chain operations director who must help ensure that enterprise ICT systems adapt to day-to-day uncertainties. -From the perspective of cyber supply chain customers who are concerned about how to ensure day to day business continuity of ICT systems and also cope with low probability but high impact events such as a cyber-terrorist event.
Credit Only Granted for: BULM744 or BMGT703.

BMGT706 Capstone - Cybersecurity Leadership (3 Credits)
Builds on the background from other foundational courses in the Professional Studies Certificate in Cybersecurity Leadership program and utilizes team-based consulting projects to provide students with a methodology and hands-on experiment for diagnosing and solving real world Cybersecurity assurance problems.

BMGT708 Special Topics in Cybersecurity (3 Credits)
Special Topics in Cybersecurity
Repeatable to: 9 credits if content differs.

BMGT710 Global Strategy (2 Credits)
Focuses on the "strategic" and "organizational" questions that a company must address as it globalizes its footprint. Among the questions that will be addressed are: What are the potential benefits, costs, and risks associated with going abroad? What differentiates a "global" from a "multidomestic" industry? What are the sources of competitive advantage in a global context?
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI674, BUMO754, or BMGT710.

BMGT720 Innovation & Product Development (2 Credits)
This course focuses on the development of innovations - new products or new services - from the perspective of a marketer. For an innovation to be successful in the market, it has to be customer-centric: hence, in this course, we study how to develop and bring to market elegant and efficient solutions to strong customer needs. This is a fundamental business challenge, faced while working in a startup or in an established company; when developing a new product or a new service; and when serving customers who are individuals or large corporations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758P or BMGT720.

BMGT730 Valuation in Corporate Finance (2 Credits)
An advanced topics course in Corporate Finance dealing with valuation. Main topics will be, building pro forma statements, cost of capital, using ratios and comparables to value projects and firms, dicounted cash flow valuations, WACC and APV methods of valuation and Real Option Valuations.
Prerequisite: BMGT600.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.

BMGT740 Global Supply Chain Management (2 Credits)
Offers a practical blueprint for understanding, building, implementing, and sustaining supply chains in today's rapidly changing global supply chain environment. It will provide the student with a survey of the fast-moving Supply Chain Management discipline and practice, including the evolution of supply chain strategies, business models and technologies; current best practices in demand and supply management; and methodologies for conducting supply chain-wide diagnostic assessments and formulating process improvement plans.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI672 or BMGT740.

BMGT758 Special Topics in Business and Management (1-4 Credits)
Selected advanced topics in the various fields of graduate study in business.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.

BMGT788 Mastery Topic for EMBA (2 Credits)
Selected mastery topics which will cover various aspects of executive education.
Restriction: Must be in Executive MBA program.
Repeatable to: 8 credits if content differs.

BMGT789 Action Learning Project (3-4 Credits)
Significant consulting project, team designed by individual EMBA student participants and faculty.
Restriction: Must be in Executive MBA program.
Repeatable to: 10 credits if content differs.

BMGT808 Special Topics in Information Systems (1-9 Credits)
Special topics specific to the Information Systems doctoral field of study.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 18 credits if content differs.

BMGT811 Seminar in Financial Accounting (3 Credits)
Seminar in selected classic and current theoretical and empirical research in financial accounting.

BMGT818 Special Topics in Accounting and Information Assurance (1-9 Credits)
Special topics specific to the Accounting and Information Assurance doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT820 Research Methods (3 Credits)
The purpose of this course is to introduce doctoral students to the philosophy of science and methods for conducting business research. This course is appropriate for all doctoral students who want to develop a basic understanding of these fundamental business research techniques and when it is appropriate to use them.
Restriction: Must be in Business and Management (Doctoral) program; or permission of instructor.

BMGT821 Seminar in Management Accounting (3 Credits)
Design and use of accounting information systems for managerial planning and controllership.

BMGT828 Independent Study in Business and Management (1-9 Credits)

BMGT830 Operations Research: Linear Programming (3 Credits)
Concepts and applications of linear programming models, theoretical development of the simplex algorithm, and primal-dual problems and theory.
Prerequisite: MATH240; or students who have taken courses with comparable content may contact the department; or permission of BMGT-Robert H. Smith School of Business.

BMGT831 Operations Research: Extension of Linear Programming and Network Analysis (3 Credits)
Concepts and applications of network and graph theory in linear and combinatorial models with emphasis on computational algorithms.
Prerequisite: BMGT830; or students who have taken courses with comparable content may contact the department; or permission of BMGT-Robert H. Smith School of Business.

BMGT833 Operations Research: Integer Programming (3 Credits)
Theory, applications, and computational methods of integer optimization. Zero-one implicit enumeration, branch and bound methods, and cutting plane methods.
Prerequisite: BMGT830; and (MATH241; or students who have taken courses with comparable content may contact the department). Or permission of BMGT-Robert H. Smith School of Business.

BMGT834 Operations Research: Probabilistic Models (3 Credits)
Theoretical foundations for the construction, optimization, and applications of probabilistic models. Queuing theory, inventory theory, Markov processes, renewal theory, and stochastic linear programming.
Prerequisite: MATH241; and (STAT400; or students who have taken courses with comparable content may contact the department). Or permission of BMGT-Robert H. Smith School of Business.

BMGT835 Simulation of Discrete-Event Systems (3 Credits)
Simulation modeling and analysis of stochastic discrete-event systems such as manufacturing systems, inventory control systems, and computer/ communications networks.
Prerequisite: Knowledge of Fortran, Basic, C, or Pascal.

BMGT836 Applied Regression Models (3 Credits)
An introduction to regression models used in business research. Topics include: simple and multiple regression, diagnostics for checking model adequacy, transformations, polynomial models, indicator variables, multicollinearity, variable selection, times series data, generalized linear models, implementation using statistical software, and application to research questions.
Recommended: It is assumed that the student has taken a first course in statistics and is familiar with the content of such course including interval estimation and hypothesis testing.

BMGT837 Applied Multivariate Analysis (3 Credits)
Multivariate statistical methods and their use in empirical research. Topics include: summarization and visualization of multivariate data, the multivariate normal distribution, tests on mean vectors, multivariate paired comparisons, multivariate analysis of variance, repeated measures designs, test on covariance matrices, discriminant analysis and classification, canonical correlation, principal components, factor analysis and cluster analysis. Maximum likelihood estimation and the likelihood ratio method of test construction.
Recommended: BMGT836 or equivalent course. BMGT837 assumes working knowledge of matrices and elementary linear algebra and a sound understanding of univariate statistics, including random variables, statistical inference, ANOVA, and ordinary least squares regression.

BMGT838 Special Topics in Operations Management/Management Science (1-9 Credits)
Special topics specific to the Operations Management/Management Science doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT840 Seminar in Financial Theory (3 Credits)
Seminar in selected classic and current theoretical and empirical research in the foundations of finance.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.

BMGT841 Seminar in Corporate Finance (3 Credits)
Seminar in selected classic and current theoretical and empirical research in corporate finance.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.

BMGT843 Seminar in Portfolio Theory (3 Credits)
Seminar in selected classic and current theoretical and empirical research in portfolio theory.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.

BMGT848 Special Topics in Finance (1-9 Credits)
Special topics specific to the Finance doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT858 Special Topics in Marketing (1-9 Credits)
Special topics specific to the Marketing doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT868 Special Topics in Organizational Behavior/Human Resource Management (1-9 Credits)
Special topics specific to the Organizational Behavior/Human Resource Management doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT878 Special Topics in Strategic Management and Entrepreneurship (1-9 Credits)
Special topics specific to the Strategic Management and Entrepreneurship doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT881 Applied Regression Models (3 Credits)
An introduction to regression models used in business research. Linear models, nonparametric methods, spatio-temporal models, methods for functional data, choice models, and methods for hierarchical, clustered and networked data. Hands-on learning via discussion of scholarly business papers, implementation using advanced statistical software, and application to research questions.

BMGT882 Applied Multivariate Analysis I (3 Credits)
Multivariate statistical methods and their use in empirical research. Topics include summarization and visualization of multivariate data, principal components, metric multidimensional scaling, canonical correlation, multivariate paired comparisons and repeated-measures designs, multivariate analysis of variance, and discriminant analysis. The maximum likelihood and likelihood ratio principles are also discussed. An important component of the course is analysis of business data using contemporary software.
Prerequisite: ECON624, ECON621, and EDMS651; or permission of BMGT-Robert H. Smith School of Business.

BMGT887 Bayesian Inference and Decision Theory (3 Credits)
Bayesian Methodologies in statistical inference and decision theory. Includes discussion of subjective probability and coherence, elicitation of distributions conjugate distributions, estimation, testing, preposterior analysis and regression analysis. Applications are drawn from the functional business areas.

BMGT888 Special Topics in Supply Chain Management (1-9 Credits)
Special topics specific to the Supply Chain Management doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT898 Pre-Candidacy Research (1-8 Credits)

BMGT899 Doctoral Dissertation Research (1-8 Credits)

BSCI - Biological Sciences Program

BSCI401 Animal Communication (3 Credits)
Examining the mechanisms by which animal produce and receive signals in each sensory modality; and quantifying the type and amount of information conveyed in signals and how animals attend to such information.
Prerequisite: BSCI160 and BSCI161; or BSCI106. And must have completed one semester of physics; and must have completed one semester of organic chemistry.
Recommended: A course in animal behavior or biopsychology.
Credit Only Granted for: BSCI401, BSCI 338W or BIOL 708W.
Formerly: BSCI338W.

BSCI402 Genomics of Sensory Systems (3 Credits)
An advanced course covering topics on the molecular basis of senses and the application of genomic techniques to studies of sensory systems & sensory ecology.
Prerequisite: BSCI222; or permission of instructor.
Credit Only Granted for: BSCI338C or BSCI402.
Formerly: BSCI338C.

BSCI403 Biology of Vision (3 Credits)
An upper level undergraduate course on the physical, molecular, and neural basis of vision.
Prerequisite: BSCI207.
Recommended: BSCI222.
Credit Only Granted for: BSCI 338V or BSCI 403.
Formerly: BSCI 338V.

BSCI404 Cell Biology from a Biophysical Perspective (3 Credits)
An approach to cell biology by focusing on mechanisms and unifying physical paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think mechanistically and quantitatively.
Prerequisite: BSCI330.
Recommended: PHYS121 and PHYS122; or completion of PHYS131 and PHYS132 recommended. Also offered as: BIOL704, BIPH704.
Credit Only Granted for: BSCI338O, BSCI404, BIOL704, BIOL708O, or BIPH704.
Formerly: BSCI338O.

BSCI405 Population and Evolutionary Genetics (3 Credits)
Genetic variation within a population provides the basis for future evolution as well as a record of past evolution. The genomics revolution provides data on this variation that, together with mathematical models, allow us to read this record to reconstruct evolutionary trajectories. Examples will focus on hominin and pathogen evolution. In the lab, students will use models to explore how genetic variation (allele frequencies) changes over time and space.
Prerequisite: Minimum grade of C- in BSCI222; and 1 course with a minimum grade of C- from (MATH131, MATH136, MATH141). Also offered as: BIOL709.
Credit Only Granted for: BSCI405, BSCI339J, or BIOL709C.
Formerly: BSCI339J.

BSCI410 Molecular Genetics (3 Credits)
An advanced genetics course emphasizing the molecular basis of gene structure and function in the context of modern approaches to the genetics of humans and model organisms.
Prerequisite: BSCI222. And must have completed CHEM233; or (CHEM231 and CHEM232).

BSCI411 Bioinformatics and Integrated Genomics (4 Credits)
Computational methods for the study of biological sequence data in comparative biology and evolution. Analysis of genome content and organization. Database searching, pairwise and multiple sequence alignment, phylogenetic, methods, pattern recognition, and functional inference. Functional and comparative genomics approaches.
Prerequisite: Minimum grade of C- in BSCI222.
Recommended: BSCI410.
Credit Only Granted for: BSCI380 or BSCI411.
Formerly: BSCI380.

BSCI412 Microbial Genetics (4 Credits)
A laboratory/lecture based course that covers the fundamentals of mutation, mobile genetic elements and transmission genetics of microbial organisms using both classical and molecular approaches.
Prerequisite: BSCI223 and BSCI222.

BSCI413 Recombinant DNA (3 Credits)
An advanced course presenting the tools and procedures of genetic engineering. Theory and practical applications of recombinant DNA techniques to understanding eukaryotic gene structure and expression.
Prerequisite: BSCI330, BSCI223, or BSCI230; and BSCI222.
Formerly: ZOOL452.

BSCI414 Recombinant DNA Laboratory (3 Credits)
An advanced course offering hands-on experience in performing recombinant DNA experiments. All current molecular biology techniques used for cloning prokaryotic genes, analyzing the gene products, and modifying the genes will be performed. Techniques include isolation of DNA, use of restriction enzymes; cloning procedures, PCR analysis, and Southern hybridizations. Lecture material focuses on interpretation of results generated in the laboratory.
Prerequisite: BSCI222.

BSCI415 Molecular Genetics Laboratory (3 Credits)
Problem solving laboratory organized around extended projects that employ different approaches toward linking gene and function.
Prerequisite: Must have completed or be concurrently enrolled in BSCI410.
Restriction: Junior standing or higher.
Credit Only Granted for: BSCI348G or BSCI415.
Formerly: BSCI348G.

BSCI416 Human Genetics (3 Credits)
Approaches to human genetics and applications to biology and medicine focusing on specific human genetic topics using primary research papers as the main resource.
Prerequisite: Minimum grade of C- in BSCI410.
Recommended: BSCI330.

BSCI417 Microbial Pathogenesis (3 Credits)
Current research in microbial pathogenesis and the molecular and cellular basis of bacterial disease. Comprehensive overview of the molecular basis of pathogenesis with a focus on model microbial systems to illustrate mechanisms of disease pathogenesis. Topics covered: how microorganisms attach to and enter cells; how host cells are damaged by microbial products; how the host responds to invasion; and host-pathogen evolution.
Prerequisite: BSCI223 and BSCI222.
Restriction: Junior standing or higher.
Credit Only Granted for: BSCI348M or BSCI417.
Formerly: BSCI348M.

BSCI420 Cell Biology Lectures (3 Credits)
Molecular and biochemical bases of cellular organization and function in eukaryotes.
Prerequisite: BSCI330, BSCI222, CHEM231, and CHEM232.
Credit Only Granted for: BSCI420 or BSCI421.

BSCI421 Cell Biology (4 Credits)
Molecular and biochemical basis of cellular organization and function in eukaryotes.
Prerequisite: BSCI330, BSCI222, CHEM231, and CHEM232.
Credit Only Granted for: BSCI420 or BSCI421.

BSCI422 Principles of Immunology (3 Credits)
The immune system in health and disease. Presentation and analysis of the cellular and molecular processes that comprise the immune system.
Prerequisite: BSCI223 and BSCI222.
Recommended: BSCI330.
Restriction: Junior standing or higher.

BSCI423 Immunology Laboratory (2 Credits)
Current techniques for assessment of immune status and evaluation of the immune response, including monoclonal antibody production, Western blotting, cytokine assays, ELISA and flow cytometry.
Prerequisite: BSCI223 and BSCI222.
Corequisite: BSCI422.
Restriction: Junior standing or higher.

BSCI424 Pathogenic Microbiology (4 Credits)
The role of bacteria and fungi in the diseases of humans with emphasis upon the differentiation and culture of microorganisms, types of disease, modes of disease transmission, prophylactic, therapeutic, and epidemiological aspects.
Prerequisite: BSCI223.

BSCI425 Epidemiology and Public Health (3 Credits)
History, characteristic features of epidemiology; the important responsibilities of public health; vital statistics.
Prerequisite: BSCI223.

BSCI426 Membrane Biophysics (3 Credits)
Quantitative aspects of biology and the use of mathematical descriptions of biological phenomena. The focus will be on membrane structure, transport, and bioenergetics.
Prerequisite: BSCI330; and (PHYS142, PHYS122, or PHYS132); and (MATH130, MATH136, or MATH140).

BSCI427 Principles of Microscopy (2 Credits)
An introduction to optical principles that underlie light and electron microscopic image formation. Brightfield, darkfield, phase contrast, differential interference contrast, fluorescence and polarized light microscopy. Comparison of light and electron microscopy. The application of these techniques to problems in biological research.
Prerequisite: BSCI421.

BSCI430 Developmental Biology (3 Credits)
Structural, functional and regulatory events and mechanisms that operate during development to produce an integrated, multicellular organism composed of a multitude of differentiated cell types.
Prerequisite: BSCI222 and BSCI330.

BSCI433 Biology of Cancer (3 Credits)
Causes and consequences of neoplastic transformations at the biochemical and cellular levels.
Prerequisite: BSCI222 and BSCI330; or permission of CMNS-Biological Sciences UG Program.

BSCI434 Mammalian Histology (4 Credits)
A study of the microscopic anatomy, ultrastructure and histophysiology of tissues and organs of mammals.
Prerequisite: BSCI330 and BSCI440; or permission of CMNS-Biological Sciences UG Program.

BSCI437 General Virology (3 Credits)
Discussion of the physical and chemical nature of viruses, virus cultivation and assay methods, virus replication, viral diseases with emphasis on the oncogenic viruses, viral genetics, and characteristics of the major virus groups.
Prerequisite: BSCI222; or permission of CMNS-Biological Sciences UG Program.
Restriction: Junior standing or higher.

BSCI440 Mammalian Physiology (4 Credits)
A study of the cardiovascular, hemopoietic, gastrointestinal, renal and respiratory systems. Chemical and endocrine regulation of physiological functions in mammals. Course does not count as an upper level lab for BIOL majors (see BSCI441).
Prerequisite: BSCI330; and (CHEM231 and CHEM232; or must have completed CHEM233). Or permission of CMNS-Biological Sciences UG Program.

BSCI441 Mammalian Physiology Laboratory (2 Credits)
Laboratory exercises in experimental mammalian physiology.
Prerequisite: Must have completed or be concurrently enrolled in BSCI440.

BSCI442 Plant Physiology (4 Credits)
A survey of plant physiology and development and responses and adaptation to the environment
Prerequisite: BSCI170 and BSCI171; or BSCI105; or PLSC201. And CHEM231 and CHEM232; or CHEM237; or permission of CMNS-Biological Sciences UG Program.
Restriction: Must not have completed ENST407; or must not have completed PLSC400. Also offered as: PLSC400.
Credit Only Granted for: BSCI442 or PLSC400.

BSCI443 Microbial Physiology (3 Credits)
Microbial cellular and population growth. Fermentation metabolism, physiology of anaerobiosis, and energy conservation and transformation in bacterial membranes. Efficiency of energy utilization for growth. Membrane structure and transport. Bacterial chemotaxis. Regulation of bacterial chromosome replication, RNA and protein synthesis. Control of metabolic pathways.
Prerequisite: Minimum grade of C- in BSCI223. And minimum grade of C- in BCHM461; or minimum grade of C- in BCHM463.

BSCI446 Neural Systems (3 Credits)
Neural development, followed by sensory, motor and integrative system organization in the central nervous system.Sponsoring Dept. (BIOL) Specialization Areas: PHNB, GENB.
Prerequisite: Minimum grade of C- in BSCI330 and BSCI353.

BSCI447 General Endocrinology (3 Credits)
Functions and dysfunctions of the endocrine system with special reference to mammals.
Prerequisite: BSCI330, CHEM241, and CHEM242.

BSCI452 Diseases of the Nervous System (3 Credits)
An advanced course covering the neuroanatomy, function, and organization of the nervous system and its implication for pathology and disease.
Prerequisite: Minimum grade of C- in BSCI330; and minimum grade of C- in BSCI353. Also offered as: NACS728, BIOL708.
Credit Only Granted for: BSCI452, BSCI338N, BIOL708E, or NACS728N.
Formerly: BSCI338N.

BSCI453 Cellular Neurophysiology (3 Credits)
The cellular and molecular basis of nervous system function.
Prerequisite: Minimum grade of C- in BSCI330, CHEM231, CHEM232, and PHYS122.

BSCI454 Neurobiology Laboratory (1 Credit)
Basic neuroanatomical techniques, intracellular and extracellular recordings of electrical potentials from nerve and muscle.
Prerequisite: Minimum grade of C- in BSCI330; and must have completed or be concurrently enrolled in BSCI353; and must have completed or be concurrently enrolled in PHYS122, PHYS132, or PHYS142.

BSCI460 Plant Ecology (3 Credits)
The dynamics of populations as affected by environmental factors with special emphasis on the structure and composition of natural plant communities, both terrestrial and aquatic.
Prerequisite: Minimum grade of C- in BSCI361.

BSCI461 Plant Ecology Laboratory (2 Credits)
Two or three field trips per semester. The application of field and experimental methods to the qualitative and quantitative study of vegetation and ecosystems.
Prerequisite: Must have completed or be concurrently enrolled in BSCI460.

BSCI462 Population Ecology (3 Credits)
Theory of population growth and regulation, life tables, and theory of competition and predation, evolution in ecological settings, community structure and dynamics.
Prerequisite: MATH130, MATH136, or MATH140. And BSCI160 and BSCI161; or BSCI106.

BSCI464 Microbial Ecology (3 Credits)
Interaction of microorganisms with the environment, other microorganisms and with higher organisms. Roles of microorganisms in the biosphere. Microorganisms and current environmental problems.
Prerequisite: BSCI223 and CHEM241. And must have completed CHEM243; or CHEM242.

BSCI465 Behavioral Ecology (3 Credits)
How natural and social environments shape individual behavior. The influence of evolution on patterns of individual adaptation. Use of the evolutionary paradigm to investigate specific problems in animal and human behavior.
Prerequisite: BSCI160 and BSCI161; or BSCI106. And BSCI222.

BSCI467 Freshwater Biology (4 Credits)
Biology and ecology of freshwater invertebrates in lotic and lentic habitats, their adaptation to aquatic life, their function in aquatic ecosystems, and their relationship to environmental deterioration. Laboratory will include field trips, demonstrations, and identifications.
Prerequisite: Permission of CMNS-Biological Sciences UG Program.

BSCI471 Molecular Evolution (3 Credits)
Patterns of DNA sequence variation within and between species, caused by nucleotide changes and the movement of transposable elements. Theories of molecular evolution, such as the neutral theory. Molecular clock hypothesis: its importance as a practical empirical tool in molecular genetics and systematics and its theoretical foundation.
Prerequisite: BSCI222; or permission of CMNS-Biology department.

BSCI472 Evolutionary Biology of Plants (3 Credits)
Evolution in plant populations. The pace, pattern, and mechanisms of evolution will be discussed within a genetic and ecological framework. Some emphasis will be placed on processes that are unique to the evolution of plants.
Prerequisite: BSCI160 and BSCI161; or BSCI106. And BSCI222.

BSCI473 Marine Ecology (3 Credits)
Courses in evolution and animal behavior are strongly recommended. A detailed analysis of the evolutionary ecology of marine invertebrates; emphasis on testing of theories and on current literature.
Prerequisite: BSCI207.

BSCI480 Arthropod Form and Function (4 Credits)
Survey of the morphological, systematic and physiological diversity of the phylum Arthropoda.
Prerequisite: Permission of CMNS-Entomology (AGNR).

BSCI481 Insect Diversity and Classification (4 Credits)
The techniques of collecting insects in the field and their classification into the latest hierarchical scheme. Field trips will visit habitats throughout the state. An insect collection is required.
Prerequisite: BSCI337.

BSCI483 Medical and Veterinary Entomology (4 Credits)
A study of the morphology, taxonomy, biology and control of the arthropod parasites and disease vectors of man and animals. The ecology and behavior of vectors in relation to disease transmission will be emphasized.
Prerequisite: Permission of CMNS-Biological Sciences UG Program.

BSCI488 Summer Biology Institutes (1-8 Credits)

BSCI493 Medicinal and Poisonous Plants (3 Credits)
A study of plants important to humans that have medicinal or poisonous properties. Emphasis on plant source, plant description, the active agent and its beneficial or detrimental physiological action and effects.
Prerequisite: (BSCI170 and BSCI171; or BSCI105); and must have completed CHEM233. Or 4 credits in BSCI courses.

BSCI494 Animal-Plant Interactions (3 Credits)
Theoretical, conceptual and applied aspects of the ecological interactions between plants and animals.
Prerequisite: BSCI160 and BSCI161; or BSCI106. And permission of CMNS-Biological Sciences UG Program.

BSCI497 Insect Pests of Ornamentals and Turf (4 Credits)
The recognition, biology and management of insects and mites injurious to ornamental shrubs, trees, greenhouse crops, and turf. Emphasis on Integrated Pest Management (IPM).

BSOS - Behavioral and Social Sciences

BSOS438 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

BSOS448 Teaching Assistant Practicum (1-6 Credits)
Supervised practicum for teaching assistants for BSOS/UNIV courses.
Repeatable to: 9 credits.

BSOS678 Special Topics in Justice Leadership (3 Credits)
Crime and Criminal Justice in Vietnam. Issues that will be focused on the present situation of crime in Vietnam; causes and conditions of criminal activities; include crime forecasting and crime prevention in Vietnam. Also, provides comprehensive overview on the Criminal Justice System in Vietnam and relations among authorities.
Repeatable to: 18 credits if content differs.

BSOS685 Big-Data Analysis on the BSOS HPC Cluster (2 Credits)
Social media are a primary source of information on social interaction and personal interests. High-performance computing (HPC) is employed to search for hidden pattern and unknown correlations using advanced machine-learning algorithms available in python and R packages. The main steps of Natural Language Processing and big-data analysis are being worked out, from examining random samples to analyzing large data sets via in-memory Monte-Carlo applications and neural networks.
Prerequisite: Students must have completed a least one college-level statistics course.
Recommended: A working knowledge of python or R is expected.
Restriction: Students must be enrolled in a BSOS graduate program; or permission of instructor.
Credit Only Granted for: BSOS385, BSOS685, or BSOS688B.
Formerly: BSOS688B.

BSST - Terrorism Studies

BSST458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

BSST630 Motivations and Intents of Terrorists and Terrorist Groups (3 Credits)
Examines motivations for terrorism from an interdisciplinary perspective, with emphasis on political and applied social psychological perspective. Topics may include: defining terrorism; preconditions; recruitment; domestic and international terrorism; and case studies and analysis of terrorist organizations.
Restriction: Must be in the Terrorism Analysis Graduate Certificate Program.
Credit Only Granted for: BSOS630 or BSST630.
Formerly: BSOS630.

BSST631 Societal Impacts of and Responses to Terrorism (3 Credits)
Explores the manners in which a variety of different actors respond to both terrorist incidents and the threat of terrorism. Examines local responses to terrorist incidents; local impacts of terrorism including effects on individual and group attitudes and behaviors; policy decisions made in response to both terrorist attacks and the threat of terrorism; terrorism prevention, deterrence, interdiction, and mitigation efforts; and individual and community recovery from terrorist attacks.
Restriction: Must be in Terrorism Analysis Graduate Certificate Program; or permission of department.
Credit Only Granted for: BSOS631 or BSST631.
Formerly: BSOS631.

BSST632 Development of Counterterrorism Policies and Programs (3 Credits)
Addresses the formulation, adoption, effectiveness, impacts, and afterlives of counterterrorism policies and programs.
Restriction: Must be in the Terrorism Analysis Graduate Certificate Program; or permission of department.
Credit Only Granted for: BSOS632 or BSST632.
Formerly: BSOS632.

BSST633 Research Methods in Terrorism and Counterterrorism (3 Credits)
Provides students with the opportunity to conduct original research, while exposing them to analytical tools relevant to the study of terrorism. Students will work with a range of data sources on domestic and international terrorism, and will be tasked with using data to test hypotheses related to the causes, behaviors, and/ or impacts of terrorism.
Credit Only Granted for: BSOS633 or BSST633.
Formerly: BSOS633.

BSST634 Legal and Criminal Approaches to Counterterrorism (3 Credits)
The United States and many of her allies have challenged long-standing legal boundaries in their effort to combat terrorism. This course examines these responses, including: increased criminalization of terrorism related activities; aggressive criminal prosecutions; detention of suspected terrorists indefinitely in far-off prisons; implementation of enhanced interrogation techniques; launch of drones to kill alleged terrorists, even U.S. citizens; and deployment of a vast system of mass surveillance.
Restriction: Must be in the Graduate Certificate in Terrorism Analysis; or permission of instructor.

BSST635 Countering Violent Extremism: Policy and Practice (3 Credits)
In recent years, the understanding of how and why individuals engage in violent extremism and terrorism has evolved and become more nuanced, as have the tools to mitigate these threats. A field of policy and practice called Countering Violent Extremism (CVE) has emerged that focuses on countering the pull of terrorist recruitment and influence by building resilience among populations vulnerable to radicalization.

BSST636 Quantitative Research Methods in Terrorism Studies (3 Credits)
Introduction to probability, statistics and data analysis, particularly with respect to how they are used in the study of terrorism. Students will learn fundamental principles of probability and statistical inference, how to summarize data and make statistical inferences, and how to manipulate and analyze data in a statistical software package (Stata) that is widely used in the discipline. The course provides a foundation in quantitative analysis that will enable students to critically evaluate extant quantitative research and manipulate their own data. It will also prepare interested students for more advanced statistics training.
Restriction: Students must be in the Graduate Certificate in Terrorism Analysis program. All other students should contact education@start.umd.edu to obtain permission to register.

BSST637 Qualitative Research Methods in Terrorism Studies (3 Credits)
Explores research design and qualitative methods using a hands-on approach. The course considers general themes such as the logic of inquiry, the appropriateness of qualitative approaches, as well as more specific topics such as process tracing, archival research, and survey methodology. It also provides students with the opportunity to learn and apply different tools for social science research.
Restriction: Students must be in the Graduate Certificate in Terrorism Analysis program. All other students should contact education@start.umd.edu to obtain permission to register.

BSST638 Special Topics in Terrorism Studies (3 Credits)
A special topics course for students in the Global Terrorism Minor program. Topics that may be offered are Psychology of Terrorism; Development of Counterterrorism Policies and Programs; Terrorism and Popular Culture; Terrorism and the Media; International Perspective on Terrorism and Counterterrorism (Education Abroad); The Evolution of Hezbollah; Terrorism and Small Wars; Political Islam in the West.
Repeatable to: 9 credits if content differs.

BSST698 Seminar in Terrorism Studies (1-3 Credits)
A special topics seminar course for graduate students interested in terrorism studies.
Repeatable to: 9 credits if content differs.

BSST699 Independent Study in Terrorism Studies (3 Credits)
An independent study course for students in the Global Terrorism Minor program.
Repeatable to: 9 credits if content differs.

BUDT - Decision and Information Technologies

BUDT703 Business Process Anaylsis for Information Systems (2 Credits)
Helps students gain a solid foundation in the concepts, processes, tools, and techniques needed in analyzing business processes and conducting information systems projects.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT703, BMGT725, or BUDT703.
Formerly: BMGT703.

BUDT704 Database Management Systems (2 Credits)
Introduction to the conceptual and logical design of relational database systems and their use in business environments. Topics include information modeling and optimization via normalization; Structured Query Language (SQL); Client/Server architectures; Concurrency & Recovery; Data Warehousing.
Corequisite: BUSI620.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BMGT704, BMGT721, or BUDT704.
Formerly: BMGT704.

BUDT705 Data Networks and Infrastructures (2 Credits)
Technical and mangerial aspects of business data communications, networking, and telecommunications with a particular emphasis on internet-based technologies and services. Content includes history and structure of the telecommunications industry, including key legislative, regulatory and legal milestones, and management of the technical and functional components of telecommunications and data communications technology.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BMGT705, BMGT726, or BUDT705.
Formerly: BMGT705.

BUDT706 Social Media and Web 2.0 (2 Credits)
Over the past years, social computing technologies such as online communities, blogs, wikis, and social networking systems have become important tools for individuals to seek information, socialize with others, get support, collaborate on work, and express themselves. Increasingly, businesses are trying to leverage web 2.0 by using social computing technologies to communicate with customers, employees, and other business partners or to build new business models. This course will review concepts and principles related to web 2.0 and examine issues and strategies associated with business use of social computing technologies.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUDT732 Decision Analytics (2 Credits)
Analytical modeling for managerial decisions using a spreadsheet environment. Includes linear and nonlinear optimization models, decision making under uncertainty and simulation models.
Prerequisite: BUSI630.
Credit Only Granted for: BMGT732 or BUDT732.
Formerly: BMGT732.

BUDT733 Data Mining and Predictive Analytics (2 Credits)
Data mining techniques and their use in business decision making. A hands-on course that provides an understanding of the key methods of data visualization, exploration, classification, prediction, time series forecasting, and clustering.
Prerequisite: BUSI630.
Credit Only Granted for: BMGT733 or BUDT733.
Formerly: BMGT733.

BUDT758 Special Topics in Decision, Operations and Information Technologies (1-4 Credits)
Selected advanced topics in the various fields of graduate study in decision, operations and information technologies.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUDT759 Independent Study in Decision and Information Technologies (1-6 Credits)
Independent study for masters students in decision and information technologies.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUDT775 Pricing and Revenue Management (2 Credits)
Specialized course on pricing and revenue management (PRM) that provides students with tools and principles, drawn from several disciplines (Operations, Microeconomics, Decision Modeling, Statistics, Marketing, IS) to make effective pricing decisions. Topics covered include economics of pricing, strategy and tactics of PRM, pricing optimization, differentiated pricing, dynamic pricing, mark-down pricing, legal and ethical issues in models/methods used in making effective PRM decisions and managerial or organizational factors that hold the key to success in execution of PRM.
Prerequisite: BUSI630.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT758D or BUDT775.
Formerly: BUDT758D.

BUFN - Finance

BUFN602 Introduction to Financial Accounting (2 Credits)
Overview of financial accounting, periodic financial statements and the financial reporting process. Importance of financial statements as information source for creditors and investors and as a means by which managers can communicate information about their firms.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI610, BUAC602, BUFN602, or BMGT602.

BUFN610 Financial Management (2 Credits)
Focuses on the valuation of the real assets of firms as well as the valuation of stocks and bonds, the primary financial assets in an economy. While details vary, the conceptual foundations of valuation boil down to three themes: time value of money, no-arbitrage, and systematic risk.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI640, BUFN610, or BMGT610.

BUFN620 Capital Markets (2 Credits)
Designed to deepen the foundations necessary to finance focused students, especially those intending to specialize in the quantitative areas of finance including investments, fixed income, and financial engineering.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN740 or BUFN620.
Formerly: BUFN740.

BUFN630 Valuation in Corporate Finance (2 Credits)
An advanced topics course in Corporate Finance dealing with valuation. Main topics will be, building pro forma statements, cost of capital, using ratios and comparables to value projects and firms, dicounted cash flow valuations, WACC and APV methods of valuation and Real Option Valuations.
Prerequisite: BUFN610.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.
Formerly: BUFN750.

BUFN640 Financial Econometrics I (2 Credits)
In this course we study standard techniques used in the econometric analysis of financial data and discuss the underlying techniques and focus on the understanding and interpretation.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN758N of BUFN640.
Formerly: BUFN758N.

BUFN650 Financial Econometrics II (2 Credits)
A hands-on and application-oriented short course on data management and financial modeling. It introduces students to basic data management techniques and a variety of analytical models used in finance.
Prerequisite: BUFN640.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN758O or BUFN650.
Formerly: BUFN758O.

BUFN660 Derivative Securities (2 Credits)
Standard types of derivatives contracts are presented, and illustrated as to how they are used in practice. The theory of pricing these contracts is then presented in detail. The use of static and dynamic replication strategies, and the concept of no-arbitrage strategies is illustrated in numerous ways. Standard valuation techniques are covered, and standard formulas are presented. The theory is then applied to develop specific pricing and hedging strategies for various types of derivatives on different underlying assets. The management of the exposure of various risks is covered in detail as well.
Prerequisite: BUFN610.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN660, BUFN726, BUFN761 or BUFN773.
Formerly: BUFN761.

BUFN670 Financial Mathematics (2 Credits)
We will cover basic concepts in discrete-time and continuous time finance, including stochastic calculus and treatment of jumps, conditional expectations, Feyman-Kac theorem, Girsanov theorem, risk-neutral pricing of derivatives (forwards, futures, bonds,options), convex optimization. The focus is on financial models, applications, and implementation.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUFN710 Financial Strategy for Corporations (2 Credits)
An advanced course in corporate finance, focusing on the issues that firms face when they plan to raise external capital from financial markets. The focus is on the financing problems faced by mid-market to large firms and on capital raised from public markets. The forms of external finance vary from simple debt or equity to more complex securities that bundle with an element of risk management.
Prerequisite: BUFN610; or permission of BMGT-Robert H. Smith School of Business.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN751 or BUFN710.
Formerly: BUFN751.

BUFN712 Financial Restructuring (2 Credits)
Focuses on identifying ways to increase firm value through corporate restructuring. Specific topics include: mergers and tender offers, spin-offs, carve-outs, divestitures, takeover defense strategies, leveraged buy-outs, and international acquisitions. Additionally, the theory, practice and empirical evidence related to each of these topics will be covered. Emphasis will be placed on valuation analysis and strategic considerations.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN712, BUFN716, BUFN752 or BUFN754.
Formerly: BUFN752.

BUFN714 Corporate Governance and Performance (2 Credits)
Deals with corporate governance and its impact on shareholder value. Divergence of interests between corporate insiders and providers of funds leads to agency problems which can impair corporate performance and shareholder value. Various instruments of corporate governance - internal as well as external mechanisms - that can help align managerial incentives with those of outside investors, and hence help restore shareholder value will be studied.
Prerequisite: BUFN610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.
Formerly: BUFN753.

BUFN716 Corporate Risk Management (2 Credits)
Surveys the theory and practice of financial risk identification, measurement, and mitigation at financial and non-financial firms. Topics will include hedging with options and futures, interest rate risk management, Value-at-Risk (VaR), Cashflow-at-Risk (CaR), Earnings-at-Risk (EaR), credit risk, equity risk, commodities risk, exchange rate risk, and lessons from risk management disasters.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN712, BUFN716, BUFN752 or BUFN754.
Formerly: BUFN754.

BUFN717 Entrepreneurial Finance and Private Equity (2 Credits)
An advanced topics course in Corporate Finance. The major emphasis is how financiers help growing firms - and in particular young start-ups - using different types of securities at different points in the industry's and firm's life. Financing arrangements and securities studied will include private equity funds and private financings placements, Venture Capital (VC) and preferred equity, Investment Banks through Initial Public Offerings (IPOs), Private equity finds, debt and leveraged buyouts. Students will learn additional techniques that will help them understand how financiers value firms and how to understand, plan and value different financing strategies.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN755 or BUFN717.
Formerly: BUFN755.

BUFN721 International Investment (2 Credits)
Addresses international stock markets, portfolio theory, international interest rates, exchange rates and exchange rate derivatives (options, forwards, and futures), exchange rate swaps and exchange rate exposure (operating, translation, and transaction), foreign investment strategy.
Prerequisite: BUFN610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN721 or BUFN770.
Formerly: BUFN770.

BUFN722 Banking and Financial Institutions (3 Credits)
The role of financial management in banking and financial institutions. The economic role and regulation of banking and financial institutions, analysis of risks and returns on financial assets and liabilities, and the structure of assets, liabilities and capital.
Prerequisite: BUSI640.
Credit Only Granted for: BUFN722, BUFN724, or BUFN772.

BUFN723 International Corporate and Project Finance (2 Credits)
Continuation of BUFN721. Issues addressed will include captial budgeting, project financing, exhange rate exposure (operating, translation, and transaction), foreign investment strategy, and risk management.
Prerequisite: BUFN610 and BUFN721.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN723 or BUFN771.
Formerly: BUFN771.

BUFN724 Bank Management (2 Credits)
Analyze and discuss readings in bank management,with primary focus on the measurement and management of risk, including credit, market, and interest rate risk. Look at the management of liquid reserves. Examine the special nature of financial institutions, incorporating their functions, policies, services, and regulation. Study the evolving nature of the financial services industry, by reading the financial press and by having outside practitioner speakers. Focus is on U.S. banks.
Prerequisite: BUFN610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN724 or BUFN772.
Formerly: BUFN772.

BUFN726 Institutional Asset Management (2 Credits)
Examines how money is managed by organizations such as university endowments, pension funds, mutual funds, hedge funds, and private equity funds. Involves a mixture of finance and economics and emphasizes the incentives professional money managers face within the context of the organizational structure in which they operate. Particular attention is paid to compensation structures and monitoring mechanisms.
Prerequisite: BUFN610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN660, BUFN726, BUFN761 or BUFN773.
Formerly: BUFN773.

BUFN730 Applied Equity Analysis (2 Credits)
Students will learn to analyze equity securities using the basic EIC (Economy/Industry/Company) framework used in the financial industry, paying special attention to financial statement analysis. Students also will learn the primary valuation techniques used to estimate market values for equity securities.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN760 or BUFN730.
Formerly: BUFN760.

BUFN732 Fixed Income Analysis (2 Credits)
Describes important financial instruments which have market values that are sensitive to interest rate movements. Develops tools to analyze interest rate sensitivity and value fixed income securities. Defines and explains the vocabulary of the bond management business.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN732 or BUFN762.
Formerly: BUFN762.

BUFN734 Portfolio Management (2 Credits)
Provides training that is important in understanding the investment process - the buy side of the financial world. Specifically, the objective is to provide graduate-level instruction in the following topics, both in theory and in using financial markets data to test the basic theory and practice of portfolio choice and equilibrium pricing models and their implications for efficient portfolios.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN734 or BUFN763.
Formerly: BUFN763.

BUFN736 Quantitative Investment Strategies (2 Credits)
Provides an introduction to quantitative techniques of selecting equities, as used commonly among long-short equity hedge funds and other quantitative equity asset management companies. Statistical factor models are developed to locate stocks with higher expected returns, based on the observable characteristics of the stocks. Implementation issues, including statistical estimation, backtesting and portfolio construction, are covered, as is performance evaluation.
Prerequisite: BUFN610.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN764 or BUFN736.
Formerly: BUFN764.

BUFN738 Investment Fund Management (3 Credits)
Provides second-year Master in Business Administration students with the opportunity to apply the skills learned in finance classes to actual investment decisions through management of an investment fund.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Repeatable to: 9 credits.

BUFN740 Capital Markets (2 Credits)
Designed to deepen the foundations necessary to finance focused students, especially those intending to specialize in the quantitative areas of finance including investments, fixed income, and financial engineering.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN740 or BUFN620.

BUFN741 Advanced Capital Markets (2 Credits)
This course covers modern theories and techniques for investments and asset pricing. The main topics covered are: portfolio theory, pricing models, market efficiency, fixed income investment, forwards and futures, and options.
Prerequisite: BUFN620; or permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN758P or BUFN741.
Formerly: BUFN758P.

BUFN742 Financial Engineering (2 Credits)
Develop Excel and Visual Basic (VBA) models to solve problems related t portfolio management, options valuation, fixed income securities, interest rate processes, and risk management. This course thus bridges theory with the design of algorithms and models that can be directly applied in practice.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN742 or BUFN766.
Formerly: BUFN766.

BUFN744 Fixed Income Derivatives (2 Credits)
Surveys fixed income assets and related securities such as Exchange-traded bond options; bonds with embedded options; floating rate notes; caps, collars, and floors; floating rate notes with embedded options. Also surveys advanced tools for interest-rate and fixed-income portfolio management, including the use of derivative securities, and the application of binomial trees for analysis of options, and a sound understanding of stochastic yield curves.
Prerequisite: BUFN610; and BUFN732.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN765 or BUFN744.
Formerly: BUFN765.

BUFN745 Financial Programming (2 Credits)
Deepens the programming and computing skills necessary in the finance profession, especially for quantitative roles involving big data and modeling. The course aims to familiarize students with large scale financial data and to further develop practical analytical tools.
Prerequisite: BUFN650.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN758E or BUFN745.
Formerly: BUFN758E.

BUFN746 Financial Risk Management I (2 Credits)
Surveys the theory and practice of financial risk identification, measurement, and mitigation with a focus on financial firms. This is the first of a two-course sequence in risk management and begins with an understanding of what risk management entails, how risk management is conducted within the corporation, and risk governance principles, and from there takes the student through risk-adjusted performance measurement and the concept and measurement of economic capital, credit risk theory, and consumer and commercial credit risk management. Topics will also include risk transfer mechanisms and a variety of credit derivatives such as reinsurance, collateralized debt obligations (CDOs), credit-linked notes (CLNs) and credit default swaps (CDS). The concept of credit value-at-risk (VaR) is introduced and students learn how it is computed.
Prerequisite: BUSI640; and BUFN740.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUFN747 Financial Risk Management II (2 Credits)
This course is the second of a two-course sequence in financial risk management. The course focuses on introducing students to various risks associated with asset-liability management including market, interest rate and liquidity risk. Market risk focuses on losses sustained in bank trading books as may come about from fluctuations in equity, fixed-income, derivatives and other trading account values. Interest rate risk on fixed-income instruments and portfolios is also examined in detail. Students are introduced to Value-at-Risk concepts and methods including simulation and other analytic approaches to calculating VaR for market and interest rate risk. Principal components analysis is also covered and its application to calculating VaR. The remainder of the course completes the review of other risks including operational, cybersecurity, reputation, model, legal and regulatory risk.
Prerequisite: BUSI640; and BUFN740.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUFN750 Valuation in Corporate Finance (2 Credits)
An advanced topics course in Corporate Finance dealing with valuation. Main topics will be, building pro forma statements, cost of capital, using ratios and comparables to value projects and firms, dicounted cash flow valuations, WACC and APV methods of valuation and Real Option Valuations.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.
Formerly: BUFN714.

BUFN751 Financial Strategy For Corporations (2 Credits)
An advanced course in corporate finance, focusing on the issues that firms face when they plan to raise external capital from financial markets. The focus is on the financing problems faced by mid-market to large firms and on capital raised from public markets. The forms of external finance vary from simple debt or equity to more complex securities that bundle with an element of risk management.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN751 or BUFN710.

BUFN752 Financial Restructuring (2 Credits)
Focuses on identifying ways to increase firm value through corporate restructuring. Specific topics include: mergers and tender offers, spin-offs, carve-outs, divestitures, takeover defense strategies, leveraged buy-outs, and international acquisitions. Additionally, the theory, practice and empirical evidence related to each of these topics will be covered. Emphasis will be placed on valuation analysis and strategic considerations.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN712, BUFN716, BUFN752 or BUFN754.
Formerly: BUFN716.

BUFN753 Corporate Governance and Performance (2 Credits)
Deals with corporate governance and its impact on shareholder value. Divergence of interests between corporate insiders and providers of funds leads to agency problems which can impair corporate performance and shareholder value. Various instruments of corporate governance - internal as well as external mechanisms - that can help align managerial incentives with those of outside investors, and hence help restore shareholder value will be studied.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.

BUFN754 Corporate Risk Management (2 Credits)
Surveys the theory and practice of financial risk identification, measurement, and mitigation at financial and non-financial firms. Topics will include hedging with options and futures, interest rate risk management, Value-at-Risk (VaR), Cashflow-at-Risk (CaR), Earnings-at-Risk (EaR), credit risk, equity risk, commodities risk, exchange rate risk, and lessons from risk management disasters.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN712, BUFN716, BUFN752 or BUFN754.

BUFN755 Entrepreneurial Finance and Private Equity (2 Credits)
An advanced topics course in Corporate Finance. The major emphasis is how financiers help growing firms - and in particular young start-ups - using different types of securities at different points in the industry's and firm's life. Financing arrangements and securities studied will include private equity funds and private financings placements, Venture Capital (VC) and preferred equity, Investment Banks through Initial Public Offerings (IPOs), Private equity finds, debt and leveraged buyouts. Students will learn additional techniques that will help them understand how financiers value firms and how to understand, plan and value different financing strategies.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN755 or BUFN717.

BUFN758 Special Topics in Finance (1-4 Credits)
Selected advanced topics in the various fields of graduate study in finance.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUFN759 Independent Study in Finance (1-6 Credits)
Independent study for Masters students in finance.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUFN760 Applied Equity Analysis (2 Credits)
Students will learn to analyze equity securities using the basic EIC (Economy/Industry/Company) framework used in the financial industry, paying special attention to financial statement analysis. Students also will learn the primary valuation techniques used to estimate market values for equity securities.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN730 or BUFN760.

BUFN761 Derivative Securities (2 Credits)
Standard types of derivatives contracts are presented, and illustrated as to how they are used in practice. The theory of pricing these contracts is then presented in detail. The use of static and dynamic replication strategies, and the concept of no-arbitrage strategies is illustrated in numerous ways. Standard valuation techniques are covered, and standard formulas are presented. The theory is then applied to develop specific pricing and hedging strategies for various types of derivatives on different underlying assets. The management of the exposure of various risks is covered in detail as well.
Prerequisite: BUFN740.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN660, BUFN726, BUFN761 or BUFN773.
Formerly: BUFN726.

BUFN762 Fixed Income Analysis (2 Credits)
Describes important financial instruments which have market values that are sensitive to interest rate movements. Develops tools to analyze interest rate sensitivity and value fixed income securities. Defines and explains the vocabulary of the bond management business.
Prerequisite: BUFN740.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN732 or BUFN762.

BUFN763 Portfolio Management (2 Credits)
Provides training that is important in understanding the investment process - the buy side of the financial world. Specifically, the objective is to provide graduate-level instruction in the following topics, both in theory and in using financial markets data to test the basic theory and practice of portfolio choice and equilibrium pricing models and their implications for efficient portfolios.
Prerequisite: BUFN740.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN734 or BUFN763.

BUFN764 Quantitative Investment Strategy (2 Credits)
Provides an introduction to quantitative techniques of selecting equities, as used commonly among long-short equity hedge funds and other quantitative equity asset management companies. Statistical factor models are developed to locate stocks with higher expected returns, based on the observable characteristics of the stocks. Implementation issues, including statistical estimation, backtesting and portfolio construction, are covered, as is performance evaluation.
Prerequisite: BUFN763.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN764 or BUFN736.

BUFN765 Fixed Income Derivatives (2 Credits)
Surveys fixed income assets and related securities such as Exchange-traded bond options; bonds with embedded options; floating rate notes; caps, collars, and floors; floating rate notes with embedded options. Also surveys advanced tools for interest-rate and fixed-income portfolio management, including the use of derivative securities, and the application of binomial trees for analysis of options, and a sound understanding of stochastic yield curves.
Prerequisite: BUFN762.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN765 or BUFN744.

BUFN766 Financial Engineering (2 Credits)
Develop Excel and Visual Basic (VBA) models to solve problems related to portfolio management, options valuation, fixed income securities, interest rate processes, and risk management. This course thus bridges theory with the design of algorithms and models that can be directly applied in practice.
Prerequisite: BUFN740.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN742 or BUFN766.

BUFN768 Special Topics in Finance (1-4 Credits)
Selected experiential learning opportunities in advanced topics in the various fields of graduate study in finance.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.

BUFN770 International Investment (2 Credits)
Addresses international stock markets, portfolio theory, international interest rates, exchange rates and exchange rate derivatives (options, forwards, and futures), exchange rate swaps and exchange rate exposure (operating, translation, and transaction), foreign investment strategey.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN721 or BUFN770.

BUFN771 International Corporate and Project Finance (2 Credits)
Continuation of BUFN770. Issues addressed will include captial budgeting, project financing, exhange rate exposure (operating, translation, and transaction), foreign investment strategy, and risk management.
Prerequisite: BUFN770.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN724 or (BUFN770 and BUFN771).
Formerly: BUFN724.

BUFN772 Bank Management (2 Credits)
Analyze and discuss readings in bank management,with primary focus on the measurement and management of risk, including credit, market, and interest rate risk. Look at the management of liquid reserves. Examine the special nature of financial institutions, incorporating their functions, policies, services, and regulation. Study the evolving nature of the financial services inductry, by reading the financial press and by having outside practitioner speakers. Focus is on U.S. banks.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN722, BUFN724, or BUFN772.
Formerly: BUFN722.

BUFN773 Institutional Asset Management (2 Credits)
Examines how money is managed by organizations such as university endowments, pension funds, mutual funds, hedge funds, and private equity funds. Involves a mixture of finance and economics and emphasizes the incentives professional money managers face within the context of the organizational structure in which they operate. Particular attention is paid to compensation structures and monitoring mechanisms.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN660, BUFN726, BUFN761 or BUFN773.

BULM - Logistics, Business, and Public Policy

BULM700 Business Fundamentals for Supply Chain Managers I (2 Credits)
This course is part of a series of two courses Business Fundamentals for SCM part I and, part II. The series is intended to provide you with the knowledge and skills necessary to quantify the impact of supply chain management decisions on the bottom line. Students will gain a solid understanding of accounting, finance and the link between supply chain and overall financial performance. Students will analyze financial statements and explain the implications of supply chain management decisions on standard financial ratios and all components of the balance sheet and income statement. Through interactive supply chain finance models, students will demonstrate the sensitivity of outcome to multiple independent variables. Last but not least, students will also learn how to apply the net present value technique to evaluate the feasibility of investment projects in supply chain.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BULM758K or BULM700.
Formerly: BULM758K.

BULM701 Business Fundamentals for Supply Chain Managers II (2 Credits)
This is the second course of the series Business fundamentals for Supply Chain Managers. This course is intended to provide you with the knowledge and skills necessary to quantify the impact of supply chain management decisions on the bottom line. Students will gain a solid understanding of accounting, finance and the link between supply chain and overall financial performance. Students will analyze financial statements and explain the implications of supply chain management decisions on standard financial ratios and all components of the balance sheet and income statement. Through interactive supply chain finance models, students will demonstrate the sensitivity of outcome to multiple independent variables. Last but not least, students will also learn how to apply the net present value technique to evaluate the feasibility of investment projects in supply chain.
Prerequisite: BULM700; or permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758Q or BULM701.
Formerly: BULM758Q.

BULM710 Data Driven Decision Making I (2 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI630, BULM758X or BULM710.
Formerly: BULM758X.

BULM711 Data Driven Decision Making II (2 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI630, BULM758Y or BULM711.
Formerly: BULM758Y.

BULM720 The Green Supply Chain (2 Credits)
In response to international regulation of carbon emissions and increasing corporate responsibility pressures, companies are seeking to develop greener supply chains. Companies such as WalMart have undergone a paradigm shift in how they manage their businesses to emphasize environmental stewardship and due diligence on product sustainability. Students are provided with key concepts and tools for designing and managing environmentally sustainable, low-impact supply chains.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM721 Global Supply Chain Management (2 Credits)
Offers a practical blueprint for understanding, building, implementing, and sustaining supply chains in today's rapidly changing global supply chain environment. It will provide the student with a survey of the fast-moving Supply Chain Management discipline and practice, including the evolution of supply chain strategies, business models and technologies; current best practices in demand and supply management; and methodologies for conducting supply chain-wide diagnostic assessments and formulating process improvement plans.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI672 or BULM721.

BULM724 Negotiations in Supply Chain Management (2 Credits)
This high experiential course will improve students' negotiation skills and capacity to acquire and effectively use power. By using a variety of assessment tools, feedback sources, skill-building exercises, and exercise debriefings, the class will increase students' negotiating self-confidence and improve their capacity to achieve win-win solutions to individual, team, and organizational problems. The course is designed to enhance students negotiating self confidence and improve students analytical skills, interpersonal skills, creativity (e.g., identifying creative solutions to conflict), and persuasive abilities.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM726 Purchasing Management (2 Credits)
Examines purchasing methods from both a tactical and straegic viewpoint. Special emphasis is placed on developing purchasing strategies from international suppliers and the trade-offs between outsourcing and insourcing.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM731 Technology Applications in Supply Chain Management (2 Credits)
In this course, we introduce the knowledge and skills necessary to quantify the impact of supply chain management decisions on the bottom line. Students will gain an understanding of accounting, finance, production cost, scheduling, and the link between supply chain and overall financial performance.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BULM732 Networks and Influence (2 Credits)
Focuses on networks, social capital, and influence as they relate to operating effectively in organizations. It draws heavily on emerging literature related to social capital and networks, but also integrates concepts from persuasion, communication, and motivation literatures to aid your efforts to build a successful track record for yourself and your organization.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO725 or BULM732.

BULM733 Global Trade Logistics (2 Credits)
Acquaints students with managerial issues in international logistics and transportation, and provides students with an understanding of issues related to import/export management and the global marketplace.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT773 or BULM733.
Formerly: BMGT773.

BULM734 Assessing and Managing Supply Chain Risks (3 Credits)
Supply chain managers are facing an increasingly volatile operating environment, with constant danger of trading community disruption from business, social and environmental risks. Students are provided with a working knowledge of both the core techniques of supply chain risk assessment and mitigation; as well as best practices in establishing formal corporate supply chain risk management programs. A semester-long X-Treme Supply Chain Simulation will enable students to gain hands-on experience in navigating a computer company through a complex and risky four quarters of global business operations.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM735 Project Management in Dynamic Environments (2 Credits)
Addresses project management skills that are required by successful managers in increasingly competitive and faster-moving environments. Examines fundamental concepts of successful project management, and the technical and managerial issues, methods, and techniques.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BULM736 Executives in Supply Chain Management (3 Credits)
Designed to provide students an opportunity to engage in intensive interaction with senior supply chain executives from a cross-section of industries. Executives share their insights on leading competitive supply chains in the global marketplace, while students research the competitive supply chain dynamics of each executive's industry.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM742 Global Supply Chain Resources Planning (2 Credits)
Provides students with an overall understanding of how firms use an advanced supply chain planning (ASCP) application as an integral part of their materials management process which includes such activities as production planning, materials requirements planning, and distribution requirements planning.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BULM744 Global Supply Chain Risk Management (2 Credits)
Explores methods to build enterprise resillience from the perspectives of the supply chain planner and supply chain manager. Addresses concerns assessing strategic & operational risks, day to day uncertainties in demand & supply and ensuring business continuity after low probability but high impact events such as a terrorist attack or earthquake.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; and permission of BMGT-Robert H. Smith School of Business.

BULM750 Lean Sigma for Supply Chain I (2 Credits)
This course is part of a series of courses. This the second part of the Lean Six Sigma for SC Managers course series. We will be focusing on the Analyze, Improve and Control phases of the Lean Six Sigma methodology. Lean Six Sigma is a robust methodology for problem solving aiming to improve quality and reduce speed within a process. This course covers up to the Lean and Six Sigma Green Belt level body of knowledge. You will be expected to conduct a project on a case study of a business looking to improve their processes to meet customer requirements.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758L or BULM750.
Formerly: BULM758L.

BULM751 Lean Sigma for the Supply Chain II (2 Credits)
This course is part of a series of courses. The first part will cover the Introduction, Define and Measure Phases of the Lean Six Sigma Methodology. Lean Six Sigma is a robust methodology for problem solving aiming to improve quality and reduce speed within a process. This course covers up to the Lean and Six Sigma Green Belt level body of knowledge. You will be expected to conduct a project on a case study of a business looking to improve their processes to meet customer requirements.
Prerequisite: BULM750.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758V or BULM751.
Formerly: BULM758V.

BULM754 Global Transportation Management (2 Credits)
Introduces transportation as a field of managerial and governmental responsibility and presents the features that make the transportation arena unique and, thus,worthy of advanced study. Each of the five modes of transportation, along with other forms of carriage, will be considered. In addition, the importance of freight transportation within supply chain management will be examined. Issues related to passenger transportation will also be addressed. Throughout the course, particular attention will be paid to the significant impact that transportation has on economic development and growth.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758T or BULM754.
Formerly: BULM758T.

BULM756 Supply Chain Strategy (2 Credits)
Examines supply chain management at the strategic level. Through class lectures, case discussions, and assignments, students first learn about the determinants of corporate strategy. Supply chain strategies are then discussed, along with the need to properly align supply chain strategy with corporate strategy. Finally, there is a discussion of how to implement supply chain strategy, given various environmental and market considerations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758B or BULM756.
Formerly: BULM758B.

BULM758 Special Topics in Logistics, Business and Public Policy (1-4 Credits)
Selected advanced topics in the various fields of graduate study in logistics, business and public policy.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BULM759 Independent Study in Logistics Management (1-6 Credits)
Independent study for Masters students in Logistics Management.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUMK - Marketing

BUMK701 Marketing Research Methods (2 Credits)
The process of acquiring, classifying and interpreting primary and secondary marketing data needed for intelligent, profitable marketing decisions. Evaluation of the appropriateness of alternative methodologies, such as the inductive, deductive, survey, observational, and experimental. Recent developments in the systematic recording and use of internal and external data needed for marketing decisions.
Prerequisite: BUSI650 and BUSI630.
Credit Only Granted for: BMGT752 or BUMK701.
Formerly: BMGT752.

BUMK706 Marketing Analysis (2 Credits)
Introduction to modeling tools used to support marketing analysis and decision making. Applications in strategic marketing, marketing segmentation, new product development, sales promotion analysis, pricing, design of marketing mix, sales force allocation, and direct marketing. Spreadsheet driven cases and illustrative readings.
Prerequisite: BUSI650.

BUMK715 Consumer Behavior (2 Credits)
Analysis of customer decision-making and how marketing strategy can be used to influence those decisions. The framework is a buyer behavior model, in which concepts from psychology, sociology, and economics are applied to individual and organizational purchase decisions. Marketing strategies of leading firms in consumer products, technology, and services (including internet services) are analyzed using a variety of case study formats. Focus is consumer behavior; however, principles can also be applied to the decision-making of business.
Prerequisite: BUSI650.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BMGT754 or BUMK715.
Formerly: BMGT754.

BUMK716 Brand Management (2 Credits)
Brand names are valuable assets for firms. Effective brand management is critical to maintaining the long-term profitability of products and services. Topics include understanding brands from the customer's perspective, building brand equity, measuring brand equity, leveraging brand equity, managing brand portfolios and managing brands over time.
Prerequisite: BUSI650.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUMK717 Integrated Marketing Communications (2 Credits)
Marketing communications are a complex but critical component of marketing strategy. Topics include communication tools: advertising, sales promotions, corporation communications, one-on-one or direct marketing, public relations, internet communications, sponsorship/events marketing, and marketing communcation plans: defining objectives, implementing the plan, and measuring communications effectiveness. Achieving integration in the content, look, and feel of all marketing communications is stressed.
Prerequisite: BUSI650.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUMK720 Marketing Strategy (3 Credits)
Introduces students to the fundamentals of marketing. This course combines lectures, readings, case analyses and a competitive simulation. A significant part of the course involves a competitive computer-based simulation in which student teams leverage marketing data and metrics to make marketing decisions for an organization that is competing in a market against other student teams in the class.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUMK758B or BUMK720.
Formerly: BUMK758B.

BUMK722 Customer Equity Management (2 Credits)
Focuses on managing customers of a business, whether in B2B or B2C space, as a portfolio of equity; understanding the current and future value of customers to the business; selective acquisition, development, and retention of customers using latest developments in information technology.
Prerequisite: BUSI650.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUMK722 or BUMK750.

BUMK724 Customer Analysis (3 Credits)
Focuses on the analysis of customer decision-making and how marketing strategy can be used to influence those decisions. The framework used is the buyer behavior model, in which concepts from psychology, sociology, and economics are applied to individual and organizational purchase decisions. Marketing strategies of leading firms in consumer products, technology, and services (including internet services) are analyzed using a variety of case study formats.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758D or BUMK724.
Formerly: BUMK758D.

BUMK726 Statistical Programming for Customer Analytics (3 Credits)
Provides students with a foundation in probability and statistics with a focus on business applications. It also gives students a foundation for thinking in both likelihood and Bayesian frameworks. The course teaches students the basics of SAS, as well as its use in statistical analysis and statistical programming. Also addressed are basic SAS language structure, data management, OLAP, enterprise miner, statistical analysis, writing procedures.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758E or BUMK726.
Formerly: BUMK758E.

BUMK731 Business-to-Business Marketing (2 Credits)
Focus is large fraction of marketing activity directed at organizational customers (businesses, non-profits and government). Marketing strategies, tactics and analytical tools most relevant when marketing to organizational customers are covered. Readings, cases and term paper contribute to understanding how to build long term buyer/seller relationships. Course is appropriate for anyone interested in understanding relationships between organizations, including vertical strategic alliances.
Prerequisite: BUSI650.

BUMK736 Service Marketing and Management (2 Credits)
Examines special challenges service marketing poses for managers because of the intangible, heterogeneous nature of the product, and the critical role of customer contact employees in service delivery. Strategies for meeting these challanges are addressed. Topics include 1) customer relationship management, 2) the design and execution of the service delivery process, 3) the development and implementation of employee customer service skills, 4) the measurement and management of critical outcome variables, such as customer satisfaction, customer equity, and customer lifetime value, and 5) the role of emerging technology in customer service.

BUMK742 Advanced Marketing Analytics (3 Credits)
The analysis of marketing data needed for profitable marketing decisions. Advanced methods of marketing analysis for marketing decisions, including choice and count data models, joint analysis of consumers choice, quantity and timing decisions, mixture and mixture regression models, and conjoint analysis, all using data-based cases and SAS software. Applications are in the areas of strategic marketing, marketing segmentation, eye tracking for advertising effectiveness, new product development, sales promotion analysis, pricing, design of marketing mix, and direct marketing.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758K or BUMK742.
Formerly: BUMK758K.

BUMK744 Marketing Research and Analytics (3 Credits)
Provides a review of primary data collection methods for marketing data. Students will learn how to design and implement effective confirmatory research. Both direct methods such as surveys and indirect methods such as experiments will be covered. In this hands-on course, students will design and conduct research with target customers, analyze the data, and then present their results to decision makers.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758L or BUMK744.
Formerly: BUMK758L.

BUMK746 Data Science for Customer Analytics (3 Credits)
An introduction to data science and thebasic concepts of database management. The course also provides an overview of the various sources of in house data that are available to many organizations. Students will learn how to work with click stream, scanner panel and social media data. Geo-demographic datasets will be discussed and explored, and techniques for data-fusion will receive ample attention.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758W or BUMK746.
Formerly: BUMK758W.

BUMK750 Customer Equity Management (2 Credits)
Managing customers of a business, whether in B2B or B2C space, as a portfolio of equity. Understanding the current and future value of customers to the business. Topics include selective acquisition, development, and retention of customers using latest developments in information technology.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK722 or BUMK750.

BUMK753 Global Marketing (2 Credits)
The environmental, organizational, and financial aspects of global marketing are covered. It also describes the special marketing research, pricing, channels of distribution, product policy, and communication issues which face U.S. firms doing business in global markets.
Prerequisite: BUSI650.
Credit Only Granted for: BMGT753 or BUMK753.
Formerly: BMGT753.

BUMK757 Marketing Strategy (2 Credits)
A capstone marketing course. Marketing strategies designed to manage products in selected market segments. Topics covered include competitor analysis, buyer analysis, market segments, and product strengths and weaknesses; product related issues are identified and marketing strategies developed, assessed and implemented.
Prerequisite: BUSI650.
Credit Only Granted for: BMGT757 or BUMK757.
Formerly: BMGT757.

BUMK758 Special Topics in Marketing (1-4 Credits)
Selected advanced topics in the various fields of graduate study in marketing.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits.
Formerly: BMGT798.

BUMK759 Independent Study in Marketing (1-6 Credits)
Independent study for Masters students in Marketing.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUMK760 Business Policies and Ethics (2 Credits)
The standards of business conduct, morals and values as well as the role of business in society. Students will consider the sometimes conflicting interests of and claims on the firm and its objectives.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758F or BUMK760.
Formerly: BUMK758F.

BUMK762 Business Communication I (1 Credit)
A study of the standards of business conduct, morals and values as well as the role of business in society. Students will consider the sometimes conflicting interests of and claims on the firm and its objectives.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758H or BUMK762.
Formerly: BUMK758H.

BUMK764 Business Communications II (1 Credit)
Teaches students how to communicate quantitative information effectively. Focuses on developing written, spoken and presentation skills.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758G or BUMK764.
Formerly: BUMK758G.

BUMK766 Digital Analytics (2 Credits)
Examines the process of developing, implementing and analyzing strategies for successfully marketing a variety of existing and potential products and services on the Internet. Special attention is devoted to the tools and techniques unique to the electronic media.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758N or BUMK766.
Formerly: BUMK758N.

BUMK770 Retail Analytics (2 Credits)
Planning and implementing retail marketing strategies often involve sophisticated analytics. This course will teach the analytical tools needed to develop retail strategies. Both store and non-store (catalog, Internet) retailing are discussed. Also, students will learn how to evaluate the impact of environmental trends in the consumer market, competition, the economy and technology on retail strategy in the U.S. and global market.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758M or BUMK770.
Formerly: BUMK758M.

BUMK772 Innovation Analytics (2 Credits)
The economic success of many firms depends on their ability to accurately identify needs of their customers andefficiently innovate -- i.e., develop new products, new services, or new processes -- in order to meet those needs.Achieving this goal is a multi-disciplinary initiative. In this course, we focus on key analytics driven decisions faced bymanagers when approaching this important task of innovation from the customer centric perspective of a marketer.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758Y or BUMK772.
Formerly: BUMK758Y.

BUMK773 Pricing Analytics and Strategies (2 Credits)
The economic and behavioral aspects of pricing and the evaluation of innovative pricing practices such as price matching, customized pricing, bundle pricing and product line pricing. The course will cover both B2B, B2C, online and offline markets. Instruction will be through a mix of case studies, pricing simulation games, hands-on exercises, practitioner guest lectures and discussions.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758J or BUMK773.
Formerly: BUMK758J.

BUMK774 Market Forecasting (2 Credits)
Market forecasting methods for different contexts. Focus on quantitative modeling techniques based on established statistical methods. Non-statistical methods used when empirical data is scarce. This is a very hands-on class where students will apply the forecasting methods learned to real data.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758A or BUMK774.
Formerly: BUMK758A.

BUMK776 Action Learning Project (2 Credits)
Students analyze marketing data, report their findings and provide appropriate recommendations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758Q or BUMK776.
Formerly: BUMK758Q.

BUMO - Management and Organization

BUMO702 Managerial Staffing (3 Credits)
Aimed at increasing an understanding of the legal, technical, and practical issues involved in organizational staff forecasting, and hiring and termination procedures.
Credit Only Granted for: BMGT783 or BUMO702.
Formerly: BMGT783.

BUMO704 Problems and Applications in Human Resource Management (3 Credits)
Applications in the design, implementation, and evaluation of human resource management programs. Experiential learning activities and simulations.
Prerequisite: BUSI663.
Credit Only Granted for: BMGT761 or BUMO704.
Formerly: BMGT761.

BUMO712 Leadership Development (3 Credits)
Focuses on developing skills to inspire, influence and organize others to accomplish key goals. Building on leadership theories, course includes assessment & role-playing activities, discussions, cases, and exercises to assess and develop personal capabilities.
Prerequisite: BUSI664.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO714 Competitive and Collaborative Negotiation (2 Credits)
Increase negotiating self-confidence and improve capacity to achieve win-win solutions to organizational problems. Improve effectiveness at finding creative solutions to conflict.
Corequisite: BUMO715.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUMO714 or BMGT700.

BUMO715 Advanced Negotiation Challenges (2 Credits)
Practice negotiations using multiple media (email, phone). Multiple party negotiations. Cross-cultural negotiations.
Corequisite: BUMO714.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO720 Understanding Organizational Change (2 Credits)
Develops the fundamental change knowledge and skills of MBA students who plan to work with organizations as change agents, whether internally as managerial employees or externally as outside consultants. Draws on literatures from organizational behavior, human resource management and strategic management to identify models as prescriptions of change.
Prerequisite: BUSI664 or BUSI662.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO721 Managing Organizational Change (2 Credits)
Develops the advanced knowledge and skills of MBA students who plan to work with organizations as change agents. Concrete and useful strategies, tools, and interventions for diagnosing organizational change situations, analyzing problems, and designing and implementing organizational change. Diverse approaches to leading and managing various types of organizational change.
Prerequisite: BUMO720.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO722 Organizational Behavior: A Multicultural Perspective (3 Credits)
Study of organizational behavior from a multicultural perspective.
Credit Only Granted for: BMGT765 or BUMO722.
Formerly: BMGT765.

BUMO725 Networks and Influence (2 Credits)
Focuses on networks, social capital, and influence as they relate to operating effectively in organizations. It draws heavily on emerging literature related to social capital and networks, but also integrates concepts from persuasion, communication, and motivation literatures to aid your efforts to build a successful track record for yourself and your organization.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BUMO725 or BULM732.

BUMO727 The Entrepreneur and the Entrepreneurial Team (3 Credits)
The entrepreneur and the entrepreneurial team: the entrepreneur and the team as it relates to innovation, change, power, and risk-taking. Entrepreneurs and their teams from a variety of different firms present and discuss their views on leadership.
Prerequisite: Completion of MBA core requirements; and permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT781 or BUMO727.
Formerly: BMGT781.

BUMO732 Entrepreneurship and New Ventures (2 Credits)
Provides an introduction to important tools and skills necessary to create and grow a successful new venture. Integrates research findings from a range of different practical and intellectual perspectives, including psychology, sociology, economics, strategic management, and history into practical, hands on lessons for an entrepreneur. Class projects provide the foundations for new, real businesses.
Credit Only Granted for: BUMO732 or BUSI660.
Formerly: BMGT780.

BUMO743 Technology Transfer Commercialization Strategies (3 Credits)
Viewing technology as a strategic resource of the firm, students develop an understanding of the processes, risks, and rewards of technology commercialization. Student teams are organized to review and select a technological innovation and then determine its commercial viability in the market place.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BMGT785 or BUMO743.
Formerly: BMGT785.

BUMO744 Creation of High Potential Ventures (3 Credits)
This course focuses on the real life experiences of high profile technology entrepreneurs. Guest entrepreneurs and book review reveal patterns of personal preparation, strategic decision-making, and action that have produced ventures with high value-added and significant regional and national impact.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BMGT787 or BUMO744.
Formerly: BMGT787.

BUMO748 Business Plan Review (3 Credits)
Evaluation of real business plans submitted to the Dingman Center for Entrepreneurship. Practicing venture capitalist and professors focus on business plan critique and writing skills, venture capitalist screening practices, and the structure of electronic commerce. Past business plan reviews are analyzed according to the business model, target market, competitive advantages/threats, stage of development, management team and financial status. Real investment decisions are made on the basis of student recommendations. Subject companies are contacted and evaluated.
Repeatable to: 6 credits.
Formerly: BMGT796.

BUMO751 Implementing Strategy: Organizing to Compete (2 Credits)
Organizational dynamics of competitive advantage. Impact of alternative organizational structures, planning and control systems, human resource management practices, and executive leadership styles on the implementation of archetypically different strategies.
Prerequisite: Must have completed or be concurrently enrolled in BUSI690. And must have completed MBA core requirements; or permission of BMGT-Robert H. Smith School of Business.

BUMO752 Strategic Growth for Emerging Companies (2 Credits)
Explores the key elements of mastering the move from being a successful small company to achieving industry significance. Supplemented by readings, video and guest speakers, the course highlights the application of practical lessons leading to strategic growth and subsequent emergence as a player.
Restriction: Must be in Business and Management (Master's) program.

BUMO753 Emerging Business Formation (2 Credits)
Business formation issues, legal obligations that affect entrepreneurial activities, the spectrum of financing methods available to emerging businesses, creating management and organization and a practical application of the tools through practical projects.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO754 Global Strategy (2 Credits)
Focuses on the "strategic" and "organizational" questions that a company must address as it globalizes its footprint. Among the questions that will be addressed are: What are the potential benefits, costs, and risks associated with going abroad? What differentiates a "global" from a "multidomestic" industry? What are the sources of competitive advantage in a global context?
Credit Only Granted for: BUSI674, BUMO754, or BMGT710.

BUMO756 Industry Analysis (2 Credits)
Conceptual framework and analytical tools for understanding the dynamics of industry structure. Impacts of past and future attractiveness of the industry on profitability. Developing and applying frameworks to devise competitive strategies in uncertain industries.
Recommended: BUSI690.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BMGT792 or BUMO756.
Formerly: BMGT792.

BUMO757 Competitor Analysis (2 Credits)
Understanding of the dynamics of how competitors interact in the marketplace. Understanding economic and behavioral motivations of industry players to design more effective strategies.
Recommended: BUSI690.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO758 Special Topics in Management and Organization (1-4 Credits)
Selected advanced topics in the various fields of graduate study in management and organization.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUMO759 Independent Study in Management and Organization (1-6 Credits)
Independent study for Masters students in management and organization.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUMO761 Creativity for Business Leaders and Entrepreneurs (2 Credits)
Examines the concept of creativity as it applies in today's and tomorrow's complex business environment. An overview of the cognitive foundations of creativity, examines many of the preconceived notions about creativity in business and discusses multiple ways in which creativity can help business leaders and entrepreneurs to succeed. Topics include creativity techniques for groups and individuals, creativity as a foundation to recognize business opportunities and develop innovative products and services, selecting ideas and making them stick, mental and organizational obstacles to creativity as well as an overview of electronic tools to increase creative capability.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI661 or BUMO761.
Formerly: BUSI661.

BUMO767 Cross-Cultural Communication and Teamwork (2 Credits)
Provide managers a sound basis for developing such competencies. Specifically, we will develop an understanding of key cultural differences, and how these differences influence the management of individuals, groups, and organizations.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI667 or BUMO767.
Formerly: BUSI667.

BUMO794 Essentials of Negotiation (2 Credits)
This highly experiential course will improve students' negotiation skills and capacity to acquire and effectively use bargaining power. By using a variety of assessment tools, feedback sources, skill-building exercises, and exercise debriefings, the class will increase students' negotiating self-confidence and improve their capacity to claim value and achieve win-win solutions to individual, team, and organizational problems. The course is designed to enhance students' negotiating self-confidence and improve students' analytical and decision-making skills (e.g., understanding bargaining zones, knowing when an agreement can be made and when to walk away; learning how to prepare for negotiations), interpersonal skills, creativity (e.g., identifying creative solutions to conflict), and persuasive abilities.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BUMO794 or BUAC723.

BUMO796 Leadership and Human Resource Management for Accountants and Auditors (3 Credits)
Develops the concepts, frameworks, and skills that are important to be effective leaders and to successfully manage human resources. Topics for discussion include: Creating a motivating and empowering environment; leadership attributes, power and effective influence; building effective decision-making; strategic management of human resources; specification of the skills and competencies requisite for job success; recruiting and selecting employees to fit the job and the organization; measuring, appraising and improving performance. All of the topics selected for discussion are critical ones that every professional needs to know, regardless of functional area (not just HR professionals), and will help students become more effective consultants, managers and leaders.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BUMO796 or BUAC725.

BUSI - Part-Time MBA Program

BUSI608 ELM: Special Topics (0 Credits)
Selected advanced topics in the various fields of graduate study in business and management.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Formerly: BMGT608.

BUSI610 Introduction to Financial Accounting (2 Credits)
Overview of financial accounting, periodic financial statements and the financial reporting process. Importance of financial statements as information source for creditors and investors and as a means by which managers can communicate information about their firms.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI610, BUAC602, BUFN602, or BMGT602.

BUSI611 Managerial Accounting (2 Credits)
Use of accounting data in corporate planning and control. Cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Prerequisite: BUSI610.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI611, BUAC616, or BMGT616.

BUSI621 Strategic and Transformational IT (2 Credits)
Introduces students to the key issues in managing information technology (IT) and provides an overview of how major IT applications in today's firms support strategic, opertaional, and tactical decisions. Topics include: synchroizing IT and business strategy; the transformational impacts of IT; evaluating and coping with new technologies; governing, managing, and organizing the IT function including outsourcing/offshoring considerations; assessing the business value of IT and justifying IT projects; and managing IT applications in functional areas to support strategy and business process.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI620 or BUSI621.

BUSI622 Managing Digital Business Markets (2 Credits)
The objective is to understand the strategic and tactical issues involved in managing digital businesses and markets. Also, some of the characteristics of digital businesses and markets that make them unique and understand how companies can best manage them will be examined.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUSI630 Data Driven Decision Making (2 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUSI634 Operations Management (2 Credits)
Operations management is concerned with efficient and effective design and operation of business processes for delivering products and/or services. Emphasis is given to process analysis and design, capacity management and bottlenecks, waiting lines and the impact of uncertainty in process performance, quality management, lean, six-sigma, and revenue management.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI634 or BMGT624.

BUSI640 Corporate Finance (2 Credits)
Focuses on the valuation of the real assets of firms as well as the valuation of stocks and bonds, the primary financial assets in an economy. While details vary, the conceptual foundations of valuation boil down to three themes: time value of money, no-arbitrage, and systematic risk.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUSI650 Marketing Management (2 Credits)
Analysis of marketing problems and evaluation of specific marketing efforts regarding the organization's products and services, pricing activities, channel selection, and promotion strategies in both domestic and international markets.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI650 or BMGT612.

BUSI662 Leadership and Teamwork (2 Credits)
Course examines concepts of team-building and leadership which are critical to managerial success. Topics include leadership, decision making, communication and conflict, work motivation, building effective teams, and organizational change and culture.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BMGT600, BUSI662, or BUSM600.

BUSI672 Global Supply Chain Management (2 Credits)
Offers a practical blueprint for understanding, building, implementing, and sustaining supply chains in today's rapidly changing global supply chain environment. It will provide the student with a survey of the fast-moving Supply Chain Management discipline and practice, including the evolution of supply chain strategies, business models and technologies; current best practices in demand and supply management; and methodologies for conducting supply chain-wide diagnostic assessments and formulating process improvement plans.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI672 or BMGT740.

BUSI673 International Economics for Managers (2 Credits)
Focuses on understanding critical aspects of the global business environment that influence firm decisions and behavior. Globalization is present in market competition, capital markets, and managerial talent as evidenced by free trade areas and economic unions forming, the volatility in global financial markets, and the continued rise of transnational firms. With globalization, the challenge for firms is to acknowledge, understand and act when appropriate - to act by sourcing, lobbying, and relocating value chain activities internationally.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUSI681 Managerial Economics and Public Policy (2 Credits)
Basic microeconomic principles used by firms, including supply and demand, elasticities, costs, productivity, pricing, market structure and competitive implications of alternative market structures. Market failures and government intervention. Public policy processes affecting business operations.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI681 or BMGT604.

BUSI683 The Global Economic Environment (2 Credits)
Relationship between national and international economic environments. Determinants of output, interest rates, prices and exchange rates. Analysis of effect of economic policies (fiscal, monetary, trade, tax) on the firm and the economy.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUSI690 Strategic Management (2 Credits)
Analyze and identify profit opportunities and threats in different industry and competitive environments; Analyze and identify a firm's valuable assets, resources and capabilities and how they might be protected, leveraged, and extended in the market; Learn how to organize your company to be the best prepared to adapt its strategy over time as the market environment changes; and how to use organic growth as well as mergers, acquisitions, joint ventures, alliances, and divestitures to ensure that the firm maintians the proper scale and scope to compete effectively over time.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI690 or BMGT614.

BUSI698 MBA Consulting Project (3-6 Credits)
Experiental research project in the identification of management problems, the evaluation of alternative solutions, and the recommendation for management.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Repeatable to: 9 credits if content differs.
Formerly: BMGT698.

BUSI758 Special Topics in Business (1-4 Credits)
Selected advanced topics in the various fields of graduate study in business.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUSI759 Independent Study in Business (1-6 Credits)
Independent study for Masters students in Business.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUSI761 The Environment of International Business (2 Credits)
The international business environment as it affects company policy and procedures. In-depth analysis and comprehensive case studies of the business functions undertaken in international operations.
Credit Only Granted for: BMGT794 or BUSI761.
Formerly: BMGT794.

BUSI764 Business Law for Managers (2 Credits)
Survey of United States legal institutions and processes as well as substantive areas of the law that affect business. Examination of tort and contract law, the legal forms of business organization and legal liability and major regulatory laws that affect business.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI764 or BUAC721.

BUSI771 New Venture Financing (2 Credits)
Development of skills for financing new ventures (both small and potentially large). Exploration of various funding sources. Criteria used in evaluation and decision process, including commercial banks, venture capital companies, small business investment companies, underwriters, private placement-financial consultants, mortgage bankers, and small business innovative research grants (U.S. Government).
Prerequisite: BUSI640; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT740 or BUSI771.
Formerly: BMGT740.

BUSI785 Project Management in Dynamic Environments (2 Credits)
Addresses project management skills that are required by successful managers in increasingly competitive and faster-moving environments. Examines fundamental concepts of successful project management, and the technical and managerial issues, methods, and techniques.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUSI788 Introduction to Global Business Experience (1-2 Credits)
Introduction to the economic climate of the country and region, history, political influences on business landscape, and specific opportunities and threats of doing business in the destination country. Course is a prerequisite to short-term study abroad classes.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Repeatable to: 2 credits.

BUSI790 Healthcare Operations Management and Marketing (3 Credits)
Introduction to a variety of tools that have been used to minimize waste and create value in the healthcare sector. These tools can also be applied to organizations outside of the healthcare sector. This course will focus on two critical aspects marketing in the context of hospitals and other health delivery organizations: service quality and customer relationship management. This course provides insight into the critical strategic decisions that healthcare managers must make as they seek to improve the performance of their organizations and attract and retain customers.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSI791 Management of High Technology, Research and Development (3 Credits)
The creation of competitive advantages through the use of new technology. The integration of technological strategy with business strategy within the internal corporate culture. Research and development in the context of this strategy-structure of the firm. The nature of Research and Development, the management of creativity, and new product development are also discussed.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT776 or BUSI791.
Formerly: BMGT776.

BUSI792 Health Informatics and Information Technologies (3 Credits)
Targeted at professionals, managers, and consultants in healthcare to develop their understanding of core health informatics knowledge, IT concepts and management skills. Students will learn about policies, standards and methods of information exchange, data quality, cloud computing, behavior and population management, personal data collection devices, and how these elements can come together as parts of systems.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSI794 Current Topics in Healthcare Transformation (3 Credits)
Covers a range of topics selected to enhance students understanding of the current healthcare environment, strategic landscape, critical policy changes, and how to lead transformation in their organizations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSI796 Health Economics and Financing (3 Credits)
Designed to provide managers and professionals with a comprehensive overview of topics related to the economics and financial aspects of healthcare. Students will gain a perspective of how the healthcare ecosystem works from an economics perspective. The knowledge will be helpful for better economic analysis and business management in healthcare.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSI798 Global Business Experience (2-4 Credits)
Provides MBA students the opportunity to combine classroom learning and project research with seminars in a host country. The focus and locations visited will vary.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 6 credits if content differs.

BUSI799 Masters Thesis Research (1-6 Credits)

BUSM - Full-Time MBA Program

BUSM600 Leadership and Teamwork (2 Credits)
Course examines concepts of team-building and leadership which are critical to managerial success. Topics include leadership, decision making, communication and conflict, work motivation, building effective teams, and organizational change and culture.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT600, BUSI662 or BUSM600.

BUSM602 Introduction to Financial Accounting (2 Credits)
Overview of financial accounting, periodic financial statements and the financial reporting process. Importance of financial statements as information source for creditors and investors and as a means by which managers can communicate information about their firms.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI610 or BUSM602.

BUSM604 Managerial Economics and Public Policy (2 Credits)
Basic microeconomic principles used by firms, including supply and demand, elasticities, costs, productivity, pricing, market structure and competitive implications of alternative market structures. Market failures and government intervention. Public policy processes affecting business operations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI681 or BUSM604.

BUSM606 Data Driven Decision Making (2-3 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI630 or BUSM606.

BUSM610 Financial Management (2-3 Credits)
Focuses on the valuation of the real assets of firms as well as the valuation of stocks and bonds, the primary financial assets in an economy. While details vary, the conceptual foundations of valuation boil down to three themes: time value of money, no-arbitrage, and systematic risk.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI640 or BUSM610.

BUSM612 Marketing Management (2 Credits)
Analysis of marketing problems and evaluation of specific marketing efforts regarding the organization's products and services, pricing activities, channel selection, and promotion strategies in both domestic and international markets.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI650 or BUSM612.

BUSM614 Strategic Management (2 Credits)
Analyze and identify profit opportunities and threats in different industry and competitive environments; Analyze and identify a firm's valuable assets, resources and capabilities and how they might be protected, leveraged, and extended in the market; Learn how to organize your company to be the best prepared to adapt its strategy over time as the market environment changes; and how to use organic growth as well as mergers, acquisitions, joint ventures, alliances, and divestitures to ensure that the firm maintians the proper scale and scope to compete effectively over time.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI690 or BUSM614.

BUSM616 Managerial Accounting (2 Credits)
Use of accounting data in corporate planning and control. Cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Prerequisite: BUSI610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI611 or BUSM616.

BUSM621 Strategic and Transformational IT (2 Credits)
Introduces students to the key issues in managing information technolog (IT) and provides an overview of how major IT applications in today's firms support strategic, opertaional, and tactical decisions. Topics include: synchroizing IT and business strategy; the transformational impacts of IT; evaluating and coping with new technologies; governing, managing, and organizing the IT function including outsourcing/ offshoring considerations; assessing the business value of IT and justifying IT projects; and managing IT applications in functional areas to support strategy and business process.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI621 or BUSM621.

BUSM622 Managing Digital Business Markets (2 Credits)
The objective is to understand the strategic and tactical issues involved in managing digital businesses and markets. Also, some of the characteristics of digital businesses and markets that make them unique and understand how companies can best manage them will be examined.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI622 or BUSM622.

BUSM624 Operations Management (2 Credits)
Operations management is concerned with efficient and effective design and operation of business processes for delivering products and/or services. Emphasis is given to process analysis and design, capacity management and bottlenecks, waiting lines and the impact of uncertainty in process performance, quality management, lean, six-sigma, and revenue management.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI634 or BUSM624.

BUSM626 The Global Economic Environment (2 Credits)
Relationship between national and international economic environments. Determinants of output, interest rates, prices and exchange rates. Analysis of effect of economic policies (fiscal, monetary, trade, tax) on the firm and the economy.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI683 or BUSM626.

BUSM701 Marketing Research Methods (2 Credits)
The process of acquiring, classifying and interpreting primary and secondary marketing data needed for intelligent, profitable marketing decisions. Evaluation of the appropriateness of alternative methodologies, such as the inductive, deductive, survey, observational, and experimental. Recent developments in the systematic recording and use of internal and external data needed for marketing decisions.
Prerequisite: BUSM606; and BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK701 or BUSM701.
Formerly: BUMK701.

BUSM702 Consumer Behavior (2 Credits)
Analysis of customer decision-making and how marketing strategy can be used to influence those decisions. The framework is a buyer behavior model, in which concepts from psychology, sociology, and economics are applied to individual and organizational purchase decisions. Marketing strategies of leading firms in consumer products, technology, and services (including internet services) are analyzed using a variety of case study formats. Focus is consumer behavior; however, principles can also be applied to the decision-making of business.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK715 or BUSM702.

BUSM703 Marketing Strategy (2 Credits)
A capstone marketing course. Marketing strategies designed to manage products in selected market segments. Topics covered include competitor analysis, buyer analysis, market segments, and product strengths and weaknesses; product related issues are identified and marketing strategies developed, assessed and implemented.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK757 or BUSM703.

BUSM704 New Product Development (2 Credits)
This course focuses on the development of innovations, new products or new services from the perspective of a marketer. For an innovation to be successful in the market, it has to be customer centric: hence, in this course, we study how to develop and bring to market elegant and efficient solutions to strong customer needs. This is a fundamental business challenge, faced while working in a startup or in an established company; when developing a new product or a new service; and when serving customers who are individuals or large corporations.
Prerequisite: BUSM612.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUSM705 Brand Management (2 Credits)
Brand names are valuable assets for firms. Effective brand management is critical to maintaining the long-term profitability of products and services. Topics include understanding brands from the customer's perspective, building brand equity, measuring brand equity, leveraging brand equity, managing brand portfolios and managing brands over time.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK716 or BUSM705.

BUSM706 Innovation & Product Development (2 Credits)
Focuses on the development of innovations - new products or new services - from the perspective of a marketer. For an innovation to be successful in the market, it has to be customer-centric: hence, in this course, we study how to develop and bring to market elegant and efficient solutions to strong customer needs. This is a fundamental business challenge, faced while working in a startup or in an established company; when developing a new product or a new service; and when serving customers who are individuals or large corporations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO758P or BUSM706.

BUSM708 Independent Study in Business (1-6 Credits)
Independent study for Masters students in Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 6 credits if content differs.

BUSM710 Advanced Marketing Analytics Models (2 Credits)
Introduction to modeling tools used to support marketing analysis and decision making. Applications in strategic marketing, marketing segmentation, new product development, sales promotion analysis, pricing, design of marketing mix, sales force allocation, and direct marketing. Spreadsheet driven cases and illustrative readings.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK706 or BUSM705.

BUSM711 Pricing Strategies for Sustainable Competitive Advantage (2 Credits)
Pricing is one of the most important marketing decisions a firm faces. This course will help participants to develop pricing strategies using actual proven concepts, processes and techniques, to align pricing strategies with corporate goals and objectives, to determine the value customers assign to products and services using competitive pricing analysis, and to optimize pricing using customer segmenting strategies. The course will focus on both economic and behavioral aspects of pricing, and evaluation of innovative pricing practices such as price matching, customized pricing, bundle pricing and product line pricing, covering both B2B and B2C markets. Instruction will be through a mix of case studies, pricing simulation games, hands-on exercises and discussions. The course will provide participants with an in-depth understanding of state-of-the-art pricing strategies, practices and techniques for making profitable and sustainable pricing decisions.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM713 Market Forecasting (2 Credits)
Students will learn a number of market forecasting methods, each appropriate for different contexts. The majority of this course focuses on quantitative modeling techniques based on established statistical methods. We also cover non-statistical methods that are often used when empirical data is scarce. This is a very hands-on class where students will apply the forecasting methods learned to real data.
Prerequisite: BUSM606 and BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM714 Integrated Marketing Communications (2 Credits)
Marketing communications are a complex but critical component of marketing strategy. Topics include communication tools: advertising, sales promotions, corporation communications, one-on-one or direct marketing, public relations, internet communications, sponsorship/events marketing, and marketing communcation plans: defining objectives, implementing the plan, and measuring communications effectiveness. Achieving integration in the content, look, and feel of all marketing communications is stressed.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK717 or BUSM707.

BUSM716 Social Media and Internet Marketing (2 Credits)
Examines the process of developing, implementing, and analyzing strategies for successfully marketing a variety of existing and potential products and services using electronic media. Besides well-established Internet marketing tools such as e-mail, search engines and display advertising, a substantial part of the course is dedicated to understanding social media, analyzing successful social media strategies, and tracking their effectiveness. The course offers hands-on experience with many popular as well as emerging techniques unique to electronic media. Special attention is given to metrics appropriate for the new media.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM731 Capital Markets (2 Credits)
Designed to deepen the foundations necessary to finance focused students, especially those intending to specialize in the quantitative areas of finance including investments, fixed income, and financial engineering.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN740 or BUSM731.

BUSM733 Valuation in Corporate Finance (2 Credits)
An advanced topics course in Corporate Finance dealing with valuation. Main topics will be, building pro forma statements, cost of capital, using ratios and comparables to value projects and firms, dicounted cash flow valuations, WACC and APV methods of valuation and Real Option Valuations.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN750 or BUSM733.

BUSM735 Financial Strategy for Corporations (2 Credits)
An advanced course in corporate finance, focusing on the issues that firms face when they plan to raise external capital from financial markets. The focus is on the financing problems faced by mid-market to large firms and on capital raised from public markets. The forms of external finance vary from simple debt or equity to more complex securities that bundle with an element of risk management.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN751 or BUSM735.

BUSM736 Corporate Risk Management (2 Credits)
Surveys the theory and practice of financial risk identification, measurement, and mitigation at financial and non-financial firms. Topics will include hedging with options and futures, interest rate risk management, Value-at-Risk (VaR), Cashflow-at-Risk (CaR), Earnings-at-Risk (EaR), credit risk, equity risk, commodities risk, exchange rate risk, and lessons from risk management disasters.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN754 or BUSM736.

BUSM737 Applied Equity Analysis (2 Credits)
Students will learn to analyze equity securities using the basic EIC (Economy/Industry/Company) framework used in the financial industry, paying special attention to financial statement analysis. Students also will learn the primary valuation techniques used to estimate market values for equity securities.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN760 or BUSM737.

BUSM738 Investment Fund Management (1-4 Credits)
Provides second-year Master in Business Administration students with the opportunity to apply the skills learned in finance classes to actual investment decisions through management of an investment fund.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; and permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 12 credits.
Credit Only Granted for: BUFN738 or BUSM738.

BUSM741 Financial Restructuring (2 Credits)
Focuses on identifying ways to increase firm value through corporate restructuring. Specific topics include: mergers and tender offers, spin-offs, carve-outs, divestitures, takeover defense strategies, leveraged buy-outs, and international acquisitions. Additionally, the theory, practice and empirical evidence related to each of these topics will be covered. Emphasis will be placed on valuation analysis and strategic considerations.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN752 or BUSM741.

BUSM743 Entrepreneurial Finance and Private Equity (2 Credits)
An advanced topics course in Corporate Finance. The major emphasis is how financiers help growing firms - and in particular young start-ups - using different types of securities at different points in the industry's and firm's life. Financing arrangements and securities studied will include private equity funds and private financings placements, Venture Capital (VC) and preferred equity, Investment Banks through Initial Public Offerings (IPOs), Private equity finds, debt and leveraged buyouts. Students will learn additional techniques that will help them understand how financiers value firms and how to understand, plan and value different financing strategies.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN755 or BUSM743.

BUSM744 Portfolio Management (2 Credits)
Provides training that is important in understanding the investment process - the buy side of the financial world. Specifically, the objective is to provide graduate-level instruction in the following topics, both in theory and in using financial markets data to test the basic theory and practice of portfolio choice and equilibrium pricing models and their implications for efficient portfolios.
Prerequisite: BUSM610; and BUSM731.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN763 or BUSM744.

BUSM747 Financial Reporting & Analysis (2 Credits)
Uses authoritative professional pronouncements to examine advanced financial reporting issues. Examines complex problems in accounting and reporting; examples include pensions, taxes, interest rate swaps, derivative securities, international transactions, and international financial reporting. Takes a user-oriented perspective, and examines the ways in which financial accounting information is used by investors, analysts, and creditors. Examples include if users adjust for alternative accounting methods or for information that is recognized versus disclosed.
Prerequisite: BUSM602.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM750 Project Management in Dynamic Environments (2 Credits)
Addresses project management skills that are required by successful managers in increasingly competitive and faster-moving environments. Examines fundamental concepts of successful project management, and the technical and managerial issues, methods, and techniques.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI785 or BUSM750.

BUSM752 Games of Strategy and Incentives (4 Credits)
Analysis of managerial decisions in strategic environments using tools from game theory; competition and cooperation in product markets; principal-agent model and the economics of incentives; analytical foundations of behavioral constructs such as reputation, commitment and credibility.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business. Or BUSM610; and BUSM604; and BUSM614.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM754 Competitive and Collaborative Negotiation (2 Credits)
Increase negotiating self-confidence and improve capacity to achieve win-win solutions to organizational problems. Improve effectiveness at finding creative solutions to conflict.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO714 or BUSM754.

BUSM755 Organizational Change (2 Credits)
Develops the advanced knowledge and skills of MBA students who plan to work with organizations as change agents. Concrete and useful strategies, tools, and interventions for diagnosing organizational change situations, analyzing problems, and designing and implementing organizational change. Draws on literature from organizational behavior, human resource management and strategic management to identify models as prescriptions of change.
Prerequisite: BUSM600.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM757 Implementing Strategy: Organizing to Compete (2 Credits)
Organizational dynamics of competitive advantage. Impact of alternative organizational structures, planning and control systems, human resource management practices, and executive leadership styles on the implementation of archetypically different strategies.
Prerequisite: BUSM614.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO751 or BUSM757.

BUSM758 Special Topics in Business (1-4 Credits)
Selected advanced topics in the various fields of graduate study in business.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUSM761 Data Mining and Predictive Analytics (2 Credits)
Data mining techniques and their use in business decision making. A hands-on course that provides an understanding of the key methods of data visualization, exploration, classification, prediction, time series forecasting, and clustering.
Prerequisite: BUSM606.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT733 or BUSM761.
Formerly: BUDT733.

BUSM762 Decision Analytics (2 Credits)
Analytical modeling for managerial decisions using a spreadsheet environment. Includes linear and nonlinear optimization models, decision making under uncertainty and simulation models.
Prerequisite: BUSM606.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT732 or BUSM762.

BUSM764 Pricing and Revenue Management (2 Credits)
Specialized course on pricing and revenue management (PRM) that provide students with tools and principles, drawn from several disciplines (Operations, Microeconomics, Decision Modeling, Statistics, Marketing, IS) to make effective pricing decisions. Topics covered include economics of pricing, strategy and tactics of PRM, pricing optimization, differentiated pricing, dynamic pricing, mark-down pricing, legal and ethical issues in models/methods used in making effective PRM decisions and managerial or organizational factors that hold the key to success in execution of PRM.
Prerequisite: BUSM606; and BUSM624.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT775 or BUSM764.

BUSM765 Social Media and Web 2.0 (2 Credits)
Over the past years, social computing technologies such as online communities, blogs, wikis, and social networking systems have become important tools for individuals to seek information, socialize with others, get support, collaborate on work, and express themselves. Increasingly, businesses are trying to leverage web 2.0 by using social computing technologies to communicate with customers, employees, and other business partners or to build new business models. This course will review concepts and principles related to web 2.0 and examine issues and strategies associated with business use of social computing technologies.
Prerequisite: BUSM621; or BUSM622.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT706 or BUSM765.

BUSM773 Innovation & Entrepreneurship (2 Credits)
Provides an introduction to important tools and skills necessary to create and grow a successful new venture. Integrates research findings from a range of different practical and intellectual perspectives, including psychology, sociology, economics, strategic management, and history into practical, hands on lessons for an entrepreneur. Class projects provide the foundations for new, real businesses.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO732 or BUSM773.

BUSM775 Global Strategy (2 Credits)
Focuses on the "strategic" and "organizational" questions that a company must address as it globalizes its footprint. Among the questions that will be addressed are: What are the potential benefits, costs, and risks associated with going abroad? What differentiates a "global" from a "multidomestic" industry? What are the sources of competitive advantage in a global context?
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO754 or BUSM775.

BUSM778 Introduction to Global Business Experience (1-4 Credits)
Introduction to the economic climate of the country and region, history political influences on business landscape, and specific opportunities and threats of doing business in the destination country. Course is a prerequisite to short-term study abroad classes.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 4 credits.
Credit Only Granted for: BUSI788 or BUSM778.

BUSM783 Global Supply Chain Management (2 Credits)
Offers a practical blueprint for understanding, building, implementing, and sustaining supply chains in today's rapidly changing global supply chain environment. It will provide the student with a survey of the fast-moving Supply Chain Management discipline and practice, including the evolution of supply chain strategies, business models and technologies; current best practices in demand and supply management; and methodologies for conducting supply chain-wide diagnostic assessments and formulating process improvement plans.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI672 or BUSM783.

BUSM784 Assessing and Managing Supply Chain Risks (2 Credits)
Supply chain managers are facing an increasingly volatile operating environment, with constant danger of trading community disruption from business, social and environmental risks. Students are provided with a working knowledge of both the core techniques of supply chain risk assessment and mitigation; as well as best practices in establishing formal corporate supply chain risk management programs. A semester-long X-Treme Supply Chain Simulation will enable students to gain hands-on experience in navigating a computer company through a complex and risky four quarters of global business operations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM734 or BUSM784.

BUSM785 Global Supply Chain Resources Planning (2 Credits)
Provides students with an overall understanding of how firms use an advanced supply chain planning (ASCP) application as an integral part of their materials management process which includes such activities as production planning, materials requirements planning, and distribution requirements planning.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM742 or BUSM785.

BUSM788 Global Business Experience (1-6 Credits)
Provides MBA students the opportunity to combine classroom learning and project research with seminars in a host country. The focus and locations visited will vary.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 8 credits if content differs.

BUSM798 Business Consulting (1-4 Credits)
Selected advanced topics in the various fields of graduate study in business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 8 credits if content differs.
Credit Only Granted for: BUSM798 or BMGT798.

CBMG - Cell Biology & Molecular Genetics

CBMG688 Special Topics in Cell Biology and Molecular Genetics (1-4 Credits)
Presentation and discussion of fundamental problems and special subjects in the topics of Cell Biology and Molecular Genetics.
Formerly: MICB688.

CBMG699 Special Problems in Cell Biology and Molecular Genetics (1-3 Credits)
Emphasis is placed on research and discussion of current problems in the area of Cell Biology and Molecular Genetics.
Repeatable to: 10 credits if content differs.
Formerly: PBIO699.

CBMG789 Seminar in Cell Biology and Molecular Genetics (2 Credits)
Cell Biology and Molecular Genetics Department Seminar.
Repeatable to: 4 credits if content differs.
Formerly: MICB789.

CBMG799 Masters Thesis Research (1-6 Credits)
Master's Thesis Research in Cell Biology and Molecular Genetics.

CBMG898 Pre-Candidacy Research (1-8 Credits)
Pre-candidacy Research.

CBMG899 Doctoral Dissertation Research (1-8 Credits)
Doctoral Dissertation Research.

CCJS - Criminology and Criminal Justice

CCJS400 Criminal Courts (3 Credits)
Criminal courts in the United States at all levels; judges, prosecutors, defenders, clerks, court administrators, and the nature of their jobs; problems facing courts and prosecutors today and problems of administration; reforms.
Prerequisite: CCJS100 and CCJS300; or permission of BSOS-Criminology & Criminal Justice department.

CCJS418 Seminar in Criminology and Criminal Justice (3 Credits)
Selected topics of interest in the field of Criminology and Criminal Justice will be covered.
Repeatable to: 18 credits if content differs.

CCJS432 Law of Corrections (3 Credits)
A review of the law of criminal corrections from sentencing to final release or release on parole. Probation, punishments, special treatments for special offenders, parole and pardon, and the prisoner's civil rights are also examined.
Prerequisite: CCJS100, CCJS105, CCJS230, and CCJS300.

CCJS440 Security Administration (3 Credits)
Designed to introduce students to the complex issues of Security Administration and the critical terrorism issues facing the nation. Emphasis is placed on understanding the historical and contemporary issues effecting U.S. Counterterrorism Policy. It also explores the challenges facing today's security administrators including: ethics, classified information, intelligence, terrorist organizations and incidents, physical and personnel security, transportation and border security issues.
Prerequisite: CCJS100 and CCJS340.
Credit Only Granted for: CCJS440 or CCJS498Z.
Formerly: CCJS498Z.

CCJS444 Advanced Law Enforcement Administration (3 Credits)
The structuring of manpower, material, and systems to accomplish the major goals of social control. Personnel and systems management. Political controls and limitations on authority and jurisdiction.
Prerequisite: CCJS100 and CCJS340.

CCJS450 Advanced Juvenile Delinquency (3 Credits)
Examination of juvenile delinquency in the United States. Nature and extent of juvenile delinquency, historical approaches, sociological and criminological theories and research, social contexts including the institutions of families, schools, and peers, and social responses. Prevention, punishment, and treatment programs, both within and outside of the juvenile justice and criminal justice systems.
Prerequisite: CCJS105 and CCJS300.
Credit Only Granted for: CCJS350 or CCJS450.

CCJS451 Crime and Delinquency Prevention (3 Credits)
Methods and programs in prevention of crime and delinquency.
Prerequisite: CCJS105 and CCJS300.

CCJS452 Treatment of Criminals and Delinquents (3 Credits)
Processes and methods used to modify criminal and delinquent behavior.
Prerequisite: CCJS105 and CCJS300.
Credit Only Granted for: CCJS 342 or CCJS 452.

CCJS453 White Collar and Organized Crime (3 Credits)
Definition, detection, prosecution, sentencing and impact of white collar and organized crime. Special consideration given to the role of federal law and enforcement practices.
Prerequisite: CCJS300; and (CCJS350 or CCJS105).

CCJS454 Contemporary Criminological Theory (3 Credits)
Examination of the main theoretical accounts that explain the underlying causes of criminal behaviors. Explore how individual choices, socialization experiences, biological factors and social structure affect criminal behaviors.
Prerequisite: CCJS300 and CCJS105.

CCJS455 Dynamics of Planned Change in Criminal Justice I (3 Credits)
An examination of conceptual and practical issues related to planned change in criminal justice. Emphasis on the development of innovative ideas using a research and development approach to change.
Prerequisite: CCJS300.
Restriction: Permission of BSOS-Criminology & Criminal Justice department.

CCJS456 Dynamics of Planned Change in Criminal Justice II (3 Credits)
An examination of conceptual and practical issues related to planned change in criminal justice. Emphasis on change strategies and tactics which are appropriate for criminal justice personnel in entry level positions.
Prerequisite: CCJS455; or permission of BSOS-Criminology & Criminal Justice department.

CCJS458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

CCJS461 Psychology of Criminal Behavior (3 Credits)
Biological, environmental, and personality factors which influence criminal behaviors. Biophysiology and crime, stress and crime, maladjustment patterns, psychoses, personality disorders, aggression and violent crime, sex-motivated crime and sexual deviations, alcohol and drug abuse, and criminal behavior.
Prerequisite: CCJS105 and CCJS300.

CCJS489 Honors Thesis Research (3 Credits)
Designed for students completing their honors thesis.
Prerequisite: CCJS100 and CCJS105.
Restriction: Limited to CCJS Departmental Honors students.

CCJS498 Selected Topics in Criminology and Criminal Justice (3 Credits)
Topics of special interest to advanced undergraduates in criminology and criminal justice. Offered in response to student request and faculty interest.
Repeatable to: 6 credits if content differs.

CCJS600 Criminal Justice (3 Credits)
Current concept of criminal justice in relationship to other concepts in the field. Historical perspective. Criminal justice and social control. Operational implications. Systemic aspects. Issues of evaluation.
Restriction: Must be in one of the following programs (Criminology and Criminal Justice (Master's); Criminology and Criminal Justice (Doctoral)) ; or permission of BSOS-Criminology & Criminal Justice department.
Formerly: CJUS600.

CCJS601 Policing (3 Credits)
An introduction to research, theory, and applications of the causes and consequences of police behavior. Community policing, problem-solving methods, police discretion, police misconduct, police crime prevention strategies, and restorative justice.

CCJS602 Courts and Sentencing (3 Credits)
Research and theory on prosecution, plea-bargaining, sentencing principles and guidelines, and sentencing policies in practice. Mandatory minimum sentencing, "three strikes" laws, race, gender and class disparities, general and specific deterrent effects of sentencing, restitution and restorative justice, diversion and sentencing to treatment.

CCJS603 Corrections (3 Credits)
An introduction to the research and policy issues for community-based and institutional correctional programs, assessment and screening tools, management of convicted offenders and institutional overcrowding. Research on prediction of recidivism, matching of treatment programs to offenders, management of correctional institutions and programs.

CCJS604 Policy Analysis Project (3 Credits)
An application of statistical and conceptual tools to criminal justice data in the student's area of concentration, resulting in a paper reporting the conceptualization, analytic methods and results. The topic of the independent study will be chosen through individual consultation with the instructor.

CCJS605 Program Evaluation for Criminal Justice (3 Credits)
Designing, implementing and evaluating programs in criminal justice. Topics include diagnosing program needs, planning and tailoring evaluation programs, program monitoring, assessing program impact, program efficiency, and the social context of evaluation.
Credit Only Granted for: CCJS605 or CCJS609.
Formerly: CCJS609.

CCJS610 Research Methods in Criminal Justice and Criminology (3 Credits)
Examination of special research problems and techniques.
Formerly: CRIM610.

CCJS611 Statistical Tools for Criminal Justice (3 Credits)
An introduction to essential statistical concepts for analyzing crime and evaluating criminal justice policies. Interpreting crime trends and correlations, risk and conditional probability analysis for repeat offenders and hot spots of crime, time series analysis, experimental statistics, effect sizes, statistical power and significance.

CCJS620 Fundamentals of Criminological Research (3 Credits)
Designed to help criminology students understand and apply three important components of statistics: decriptive statistics (including probability theory), fundamentals of statistical inference, and regression analysis. Course assumes familiarity with basic descriptive statistics. The emphasis of the classes on descriptive statistics is the calculation and interpretation of summary statistical measures for describing raw data. Covers the basic rules of probability and different probabilistic processes that could describe criminal activity. The sessions on fundamentals of statistical inferences are designed to provide background for executing and interpreting hypothesis tests and confidence intervals. The latter portion of the course focuses on regession analysis. Uses the statistical software, Stata.
Credit Only Granted for: CCJS498D or CCJS620.
Formerly: CCJS498D.

CCJS621 General Linear Models in Criminal Justice Research (3 Credits)
An in-depth exploration of applied linear regression analysis. Covers characteristics of estimates, such as unbiasedness and efficiency. Encourages fluency with the theoretical issues involved in the basic linear regression using simple algebra, familiarity with the general model using matrix algebra, and fluency with the computer application of multivariate regressions and the probit/logit models.
Prerequisite: CCJS620.
Credit Only Granted for: CCJS498F or CCJS621.
Formerly: CCJS498F.

CCJS635 Minorities and Criminal Justice (3 Credits)
Role minorities play in the criminal justice system: as victims, offenders and professionals. Also provides theoretical framework for examining these roles.
Prerequisite: CCJS600; or students who have taken courses with comparable content may contact the department.

CCJS651 Seminar in Criminology (3 Credits)
Analysis of significant recent issues in Criminology.
Formerly: CRIM651.

CCJS652 Seminar in Juvenile Delinquency (3 Credits)
Analysis of delinquency and its control.
Formerly: CRIM652.

CCJS653 Seminar in Corrections (3 Credits)
Development, operation and future of correctional systems.
Prerequisite: CCJS651; or students who have taken courses with comparable content may contact the department.
Formerly: CRIM653.

CCJS654 History of Criminological Thought (3 Credits)
A study of the development of criminological thought from antiquity to the present.
Prerequisite: CCJS454; or students who have taken courses with comparable content may contact the department.
Formerly: CRIM654.

CCJS660 Gender and Crime (3 Credits)
Assumptions, biases, and relative strengths and weaknesses of theories of crime as applied to women. Criminal justice sanctioning of crimes by and against women. The course will also explore occupational segregationby gender in criminal justice professions, particularly in the fields ofpolicing, courts (attorneys and judges), and corrections (correctionalofficers and treatment staff).

CCJS661 Crime and the Life Course (3 Credits)
Designed to provide an intensive examination of crime and the life course. Life course is examined as a theoretical orientation, a research methodology, and an empirical field of study with special reference to crime and deviance. Course includes development of criminal behavior and criminal careers; stability and change in criminal behavior across developmental stages; trajectories, transitions, and turning points through life; quantitative and qualitative approaches to studying crime and the life course; and social change and its link to individual lives.
Credit Only Granted for: CCJS699J or CCJS661.
Formerly: CCJS699J.

CCJS663 Issues in Corporate Crime (3 Credits)
Overview of what is known about corporate crime and criminals (e.g.: similarities to and differences from other offenders and crime types; characteristics of offenders and victims; what counts as corporate crime ; introduction to theoretical frameworks.) Readings and class materials will coalesce around specific issues about which there is much debate but scant empirical research. Discussions will center around what is known, what is not, what needs to be done and how.
Credit Only Granted for: CCJS699S or CCJS663.
Formerly: CCJS699S.

CCJS664 Regulating Vice and Regulating Organized Crime (3 Credits)
For this course, vice is defined as a habit with bad consequences that can generate large black markets if the market for supplying that habit is prohibited or heavily regulated. Vice if found in all modern societies, though in widely differing forms, depending on population characteristics, culture and law. Society's decision is how to regulate it, whether criminally or otherwise, and how then to assess whether the regulation is successful. This assessment has multiple components, including: choosing outcome measures; modeling counterfactuals for which the evidence is often very indirect and developing a framework for ensuring that comparisons reflect all relevant outcomes and values.
Credit Only Granted for: CCJS699V or CCJS664.
Formerly: CCJS699V.

CCJS665 Professional Development (3 Credits)
A seminar designed for students who are planning to complete their Ph.D. in Criminology and Criminal Justice. Focus on issues important to consider during one's career. Discussions and activities will include topics such as: planning one's graduate career, resumes, planning a professional career, employment opportunities, interviewing for jobs, teaching, publishing and reviewing manuscripts, grants and proposals, research, achieving tenure.
Credit Only Granted for: CCJS699D or CCJS665.
Formerly: CCJS699D.

CCJS667 Innovations in Policing: Programs, Policies and Research (3 Credits)
Examine the factors that have led to recent police innovations and recent innovations in the study of policing. Critically explores the effects of such policies on crime and disorder, on research practices, as well as unintended consequences on community, police abuse and police organization. Which policies have been found to be effective? What types of practices work most effectively for what type of crime and disorder problems? Has there been sufficient research for us to come to solid conclusions regarding these questions? Does present research fit the practices of the police?
Credit Only Granted for: CCJS667 or CCJS699W.
Formerly: CCJS699W.

CCJS670 Race, Crime, and Criminal Justice (3 Credits)
Provides an historical overview of the operation and evolution of the criminal justice system and the impact of race. How race affects definitions of crime and criminality, the workings of the criminal justice system, the development of criminological theory, and the role of criminal justice ethics in the study of race and crime will be considered.

CCJS678 Advanced Topics in Criminology and Criminal Justice (3 Credits)
An analysis of contemporary issues in criminology and criminal justice with special emphasis on research and theory developments.
Prerequisite: CCJS600.
Repeatable to: 12 credits if content differs.

CCJS680 Drugs and Crime (3 Credits)
The relationship between drug use and crime. Policy concerning drug control enforcement, prosecution and sentencing. impact of drug treatment in criminal justice Impact of drug treatment in criminal justice settings, drug courts, drug-testing strategies and surveillance of former drug abusers in the community.

CCJS699 Special Criminological Problems (1-3 Credits)
Supervised study of a selected problem in the field of criminal justice.
Restriction: Permission of BSOS-Criminology & Criminal Justice department.
Repeatable to: 6 credits.
Formerly: CJUS699.

CCJS700 Advanced Research Methods in Criminology and Criminal Justice (3 Credits)
An in-depth inventory of the methods of criminological research. It considers the philosophy of science and research ethics; discusses sampling, measurement and methods of data collection, including survey, experimental, evaluation, and qualitative research.
Prerequisite: CCJS610.

CCJS710 Advanced Statistics Methods - Limited Dependent Variables (3 Credits)
Application of advanced data analysis strategies to criminological and criminal justice problems, with specific focus on limited dependent variables.
Prerequisite: Must have completed an approved doctoral level statistics course.
Formerly: CRIM710.

CCJS711 Randomized Experiments in Criminology and Criminal Justice (3 Credits)
Constrast randomized designs with other approaches, examining both statistical, methodological, ethical and practical concerns. What are the statistical advantages of randomized experimental designs? Why do some researchers believe that randomized studies violate ethical standards in criminal justice? Why are experiments considered to have higher internal validity than non-randomized designs and how do different types of designs compare in terms of external validity? Focus on how experiments can be developed and how they are analyzed. What are the practical barriers to experimentation and how can they be overcome? What statistical methods are most appropriate for experimental analysis? How can block randomization or hierarchical modeling be used to develop more powerful or more practical research approaches?

CCJS712 Longitudinal Data Analysis with Latent Variables (3 Credits)
This course is designed for graduate students with an interest in the use of latent variables in longitudinal data analysis as it is conceptualized in the Mplus framework. This course explores more general features of latent variable analyses as they are related to longitudinal modeling. Topics to be covered include latent growth analysis with a combination of continuous and categorical latent variables as well as the inclusion of continuous and categorical variables as predictors and outcomes.
Credit Only Granted for: CCJS699F or CCJS712.
Formerly: CCJS699F.

CCJS720 Criminal Justice System Planning: Policy Analysis for Crime Control (3 Credits)
System theory and method; examination of planning methods and models based primarily on a systems approach to the operations of the criminal justice system.
Prerequisite: Must have completed 1 course in research methodology; and 1 course in CCJS.
Formerly: CJUS720.

CCJS799 Master's Thesis Research (1-6 Credits)

CCJS898 Pre-Candidacy Research (1-8 Credits)

CCJS899 Doctoral Dissertation Research (1-8 Credits)
Doctoral dissertation research in criminal justice and criminology.
Formerly: CRIM899.

CHBE - Chemical and Biomolecular Engineering

CHBE410 Statistics and Design of Experiments (3 Credits)
An introduction to probability, statistics, and design of experiments for chemical engineers.
Prerequisite: Minimum grade of C- in CHBE250, MATH241, and MATH246.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE410 or ENCH476.
Formerly: ENCH476.

CHBE422 Chemical and Biomolecular Engineering Transport Phenomena I (3 Credits)
Principals of fluid dynamics as applied to model development and process design. Mass, momentum and energy conservation. Statics and surface tension. Equation of Continuity and Navier-Stokes Equation with application to laminar flow. Dimensional analysis. Macroscopic balances, Bernoulli Equation and friction factors with application to turbulent flow.
Prerequisite: Minimum grade of C- in CHBE101, CHBE250, MATH241, and MATH246.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE422 or ENCH422.
Formerly: ENCH422.

CHBE424 Chemical and Biomolecular Engineering Transport Phenomena II (3 Credits)
Principles of mass and heat transfer as applied to model development and process design. Species continuity equation with application to diffusion, and convection in laminar flow. Macroscopic balances and mass transfer coefficients with application to turbulent flow. Microscopic equation of energy with application to heat conduction, and convection in laminar flow. Macroscopic energy balance and heat transfer coefficients with application to turbulent flow. Heat exchanger design.
Prerequisite: CHBE422.
Corequisite: CHBE302.
Restriction: Must be in Engineering: Chemical program; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE424 or ENCH424.
Formerly: ENCH424.

CHBE426 Chemical and Biomolecular Separation Processes (3 Credits)
Separation by stages operations. Rate dependent separation processes. Design application in distillation, gas absorption, liquid extraction, drying, adsorption and ion exhange.
Corequisite: CHBE302; and CHBE424.
Restriction: Must be in Engineering: Chemical program; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE426 or ENCH426.
Formerly: ENCH426.

CHBE437 Chemical and Biomolecular Engineering Laboratory (3 Credits)
Application of chemical engineering process and unit operation principals in small-scale semi-commercial equipment. Data from experimental observations are used to evaluate performance and efficiency of operations. Emphasis on correct presentation of results inreport form.
Prerequisite: CHBE424, CHBE426, and CHBE440.
Restriction: Must be in a major within ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE437 or ENCH437.
Formerly: ENCH437.

CHBE440 Chemical Kinetics and Reactor Design (3 Credits)
Fundamentals of chemical reaction kinetics and their application to the design and operation of chemical reactors. Reaction rate theory, homogeneous reactions and catalysis electrochemical reactions. Catalytic reactor design.
Prerequisite: Minimum grade of C- in CHBE301, MATH241, and MATH246.
Restriction: Must be in Engineering: Chemical program; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE440 or ENCH440.
Formerly: ENCH440.

CHBE442 Chemical and Biomolecular Systems Analysis (3 Credits)
Dynamic response applied to process systems. Goals and modes of control, Laplace transformations, analysis and synthesis of simple control systems, closed loop response, dynamic testing.
Prerequisite: CHBE424 and CHBE426.
Credit Only Granted for: CHBE442 or ENCH442.
Formerly: ENCH442.

CHBE444 Process Engineering Economics and Design I (3 Credits)
Principles of chemical engineering economics and process design. Equipment sizing and costing. Economic evaluation of projects. Flowsheet synthesis. Introduction to flowsheet simulators and concepts of flowsheet optimization. Synthesis of Heat Exchanger Networks and Distillation Sequences.
Prerequisite: CHBE424, CHBE426, and CHBE440.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE444 or ENCH444.
Formerly: ENCH444.

CHBE446 Process Engineering Economics and Design II (3 Credits)
Application of chemical engineering principles for the design of chemical processing equipment. Representative problems in the design of chemical plants will be the focus of this capstone design class. Comprehensive reports are required.
Prerequisite: CHBE442 and CHBE444.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE446 or ENCH446.
Formerly: ENCH446.

CHBE451 Photovoltaics: Solar Energy (3 Credits)
The emphasis of the class is on developing a conceptual understanding of the device physics and manufacturing processes of crystalline and thin-film photovoltaic cells, and to develop elementary computational skills necessary to quantify solar cell efficiency. The class material includes detailed, system-level energy balances necessary to understand how solar energy fits into the complete energy generation, conversion, and storage picture. Quantitative comparisons of PV technology to solar chemical conversion processes and biofuels are made.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468L or CHBE451.
Formerly: ENCH468L.

CHBE453 Applied Mathematics and Distributive Parameter Systems (3 Credits)
Mathematical techniques applied to the analysis and solution of chemical engineering problems. Use of differentiation, integration, differential equations, partial differential equations and integral transforms. Application of infinite series, numerical and statistical methods.
Credit Only Granted for: CHBE453 or ENCH453.
Formerly: ENCH453.

CHBE454 Chemical Process Analysis and Optimization (3 Credits)
Application of mathematical models to the analysis and optimization of chemical processes. Models based on transport, chemical kinetics and other chemical engineering principles will be employed.
Credit Only Granted for: CHBE454 or ENCH454.
Formerly: ENCH454.

CHBE455 Model Predictive Control (3 Credits)
Empirical model identification from process data. Step and impulse response models. Linearization of nonlinear first principles models. Single variable Model Predictive Control. Robustness with respect to modeling error. MPC based tuning of PID controllers. Feedforward control. Multi-input multi-output processes. Multi-loop decentralized control. Centralized multivariable Model Predictive Control via on-line optimization.
Credit Only Granted for: CHBE455 or ENCH455.
Formerly: ENCH455.

CHBE457 Design and Processing of Polymers for Biomedical Devices (3 Credits)
An overview of the design and processing of polymers used in medical applications. Following a discussion of the physical and mechanical properties of polymers, important classes of polymeric biomaterials will be surveyed, discussing material synthesis, processing techniques and equipment, as well as properties and performance in biomedical applications. Topics will include silicone elastomers, hydrogels, ultra-high molecular weight polyethylene, polyurethanes, polyureas, polyesters, degradable and resorbable polymeric biomaterial designs used in surgery and drug delivery, polymers for ophthalmologic and orthopedic applications, and biopolymers such as silks and collagen. Finally, the design of major industrial polymer processing equipment will be covered, and the fundamentals of extrusion, calendering, coating, fiber spinning, film blowing, and injection molding processes will be presented.
Prerequisite: MATH246; and CHEM231; and (CHBE301, ENMA461, or BIOE232).
Recommended: Knowledge of basic fluid dynamics: CHBE422/BIOE331 or equivalent.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: BIOE453, CHBE457, or ENMA425.

CHBE468 Research (1-3 Credits)
Investigation of a research project under the direction of a faculty member. Comprehensive reports are required.
Restriction: Permission of Chemical and Biomolecular Engineering Department; and must be third or fourth year student; and must have minimum GPA of 3.0; and must have successfully completed all lower level engineering, science and mathematics courses for the major.
Repeatable to: 6 credits.
Formerly: ENCH468.

CHBE470 The Science and Technology of Colloidal Systems (3 Credits)
Introduction to colloidal systems. Preparation, stability and coagulation kinetics of colloidal suspensions. Introduction to DLVO theory, electrokinetic phenomena, rheology of dispersions, surface/interfacial tension, solute absorption at gas-liquid, liquid-liquid, liquid-solid and gas-solid interfaces and properties of micelles and other microsturctures.
Prerequisite: CHBE424, CHBE426, and CHEM482.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE470 or ENCH470.
Formerly: ENCH470.

CHBE471 Particle Science and Technology (3 Credits)
Particles are everywhere. We breathe them, eat them, and use them to make many non-particulate materials. Knowledge of particle science and technology is important for manufacturing, for occupational health and safety, as well as environmental considerations. In this multidisciplinary course, the focus will be on the study of science and technology relevant to multiphase systems consisting of solid and/or liquid particles surrounded by a gas. These topics fall loosely under the headings of powder and aerosol technology. Team design projects will be an integral component.
Prerequisite: Knowledge of undergraduate engineering thermodynamics, and transport phenomena; knowledge of numerical methods for solving systems of ordinary differential equations.
Restriction: Must be in a major within ENGR-Chemical & Biomolecular Engineering department; or permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE471 or ENCH471.
Formerly: ENCH471.

CHBE472 Control of Air Pollution Sources (3 Credits)
Sources and effects of air pollutants, regulatory trends, atmospheric dispersion models, fundamentals of two-phase flow as applied to air pollution and air pollution control systems, design of systems for control of gases and particulate matter.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.

CHBE473 Electrochemical Energy Engineering (3 Credits)
The lecture will start from the basic electrochemical thermodynamics and kinetics, with emphasis on electrochemical techniques, fundamental principle and performance of batteries, and supercapacitors.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468K or CHBE473.
Formerly: ENCH468K.

CHBE475 Ethics in Science and Engineering (3 Credits)
Ethical issues in science and engineering and their resolutions are examined. The main topics will be ethics and scientific truth (including issues of proper data analysis, proper data presentation, and record-keeping), ethics and other scientists and engineers (including issues of attribution, confidentiality, conflicts of interest, mentoring, and inclusion of under-represented groups), ethics and the practice of engineering (including responsibilities of engineers to clients, ecological issues, and conflicts of interest), and ethics and society (including funding priorities, moral issues, and human and animal subjects). Class meetings will be organized around discussions, case studies, and student reports. The course is aimed at postdoctoral students, graduate students and advanced undergraduate students who wish to ponder the important contemporary questions about the ethics of how science and engineering get done.
Credit Only Granted for: CHBE475 or ENCH475.
Formerly: ENCH475.

CHBE476 Molecular Modeling Methods (3 Credits)
Statistical mechanics will be introduced to give the fundamental background for atomic to mesoscale molecular modeling. Classical atomic-level simulations methods (Monte Carlo and Molecular Dynamics) and the procedures to develop intra- and intermolecular potentials will be covered. This course will also discuss the theory and application of coarse-grained molecular simulations, mesoscale simulations and other modern simulation techniques. A broad range of applications will be included throughout the semester, e.g., phase behavior of small molecules, kinetics, and biophysics.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468P or CHBE476.
Formerly: ENCH468P.

CHBE477 Mesoscopic and Nanoscale Thermodynamics (3 Credits)
Interdisciplinary course primarily for graduate and senior undergraduate students from engineering or science departments. New emerging technologies deal with bio-membrane and gene engineering, microreactor chemistry and microcapsule drug delivery, micro-fluids and porous media, nanoparticles and nanostructures, supercritical fluid extraction and artifical organs. Engineers often design processes where classical thermodynamics may be insufficient, e.g., strongly fluctuating and nanoscale systems, or dissipative systems under conditions far away from equilibrium.
Prerequisite: A prior course in classical thermodynamics.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE477 or ENCH468Q.
Formerly: ENCH468Q.

CHBE480 Bionanotechnology: Physical Principles (3 Credits)
Physics at nano/micro scales. Biomolecular building blocks. Simplest biomolecular assembly: protein folding. Nanoscale intermolecular interactions important for biology. Protein-ligand binding. Protein higher-order assembly: filaments, networks. Protein filaments and motility. DNA, RNA and their assembly assisted by proteins. Viral capsid assembly. Lipid assembly into micelles, bilayers. Lipid-protein co-assembly in membranes. Lipid and polymer structures useful in medicine. Targeted delivery of drugs, genes by nano/micro structures. Cellular assembly in the eye, in insect wings. Cellular assembly at surfaces: gecko feet, duck feathers. Cellular assembly in the presence of crystals: biomineralization.
Prerequisite: BIOE120; or (BSCI170 and BSCI171); or BSCI105. And BCHM461; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.

CHBE481 Transport Phenomena in Small and Biological Systems (3 Credits)
Interdisciplinary course primarily for senior undergraduate and graduate students from engineering or science departments. The course's main goal is to make the students familiar with the fundamental physics and modeling of transport phenomena in small and biological systems, and their current scientific and engineering utilization in microfluidics, nanofluidics and biological systems.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468W or CHBE481.
Formerly: ENCH468W.

CHBE482 Biochemical Engineering (3 Credits)
Introduction to biochemical and microbiological applications to commericail and engineering processes, including industrial fermentation, enzymology, ultrafiltration, food and pharmaceutical processing and resulting waste treatment. Enzyme kinetics, cell growth, energetics and mass transfer.
Prerequisite: CHBE440.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE482 or ENCH482.
Formerly: ENCH482.

CHBE483 Bioseparations (3 Credits)
Engineering fundamentals of separations and purification of biological molecules. Case studies and examples illustrate principles and practice of centrifugation, precipitation, crystallization, filtration, membrane separations, chromatography, and affinity separation of recombinant proteins and other biomolecules. Process scale-up and economics of biotechnology products and processes.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH483 or CHBE483.
Formerly: ENCH483.

CHBE484 Metabolic Pathway Engineering (3 Credits)
The state-of-the-art in metabolic engineering, with a focus on the analysis and engineering of metabolic pathways through (chemical) engineering principles, will be covered. Topics covered include: (1) overview of biochemistry and metabolism; (2) metabolic flux analysis and isotope labeling illustrated with examples from the recent scientific literature; (3) technologies for engineering metabolic pathways; (4) metabolic control analysis and pathway regulation; (5) applications of metabolic engineering to synthesis of biofuels and therapeutics; (6) specialized and related subjects such as protein engineering and synthetic biology.
Prerequisite: CHBE101 and CHBE440.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468M or CHBE484.
Formerly: ENCH468M.

CHBE485 Biochemical Engineering Laboratory (3 Credits)
Techniques of measuring pertinent parameters in fermentation reactors, quantification of production variables for primary and secondary metabolites such as enzymes and antibiotics, the insolubilization of enzymes for reactors, and the demonstration of separation techniques such as ultrafiltration and affinity chromatography.
Credit Only Granted for: CHBE485 or ENCH485.
Formerly: ENCH485.

CHBE486 Heterogeneous Catalysis for Energy Applications (3 Credits)
Introduction to heterogeneous catalytic science and technology for energy conversion and hydocarbon processing. Preparation and mechanistic characterization of catalyst systems, kinetics of catalyzed reactions, adsorption and diffusion influences in heterogenious reactions. An overview of heterogeneous catalysis in various energy-related applications, including petroleum refining, chemicals from biomass, valorization of shale gas, and CO2 utilization will be introduced.
Prerequisite: Minimum grade of C- in CHBE302, CHBE424, and CHBE440; and permission of instructor.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE486 or ENCH686.

CHBE487 Tissue Engineering (3 Credits)
A review of the fundamental principles involved in the design of engineered tissues and organs. Both biological and engineering fundamentals will be considered.
Prerequisite: Must have completed at least one biology course; and MATH241.
Recommended: BSCI330 and BIOE340.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; or permission of ENGR-Chemical & Biomolecular Engineering department. Also offered as: BIOE411.
Credit Only Granted for: BIOE411, CHBE487, or ENCH468T.
Formerly: ENCH468T.

CHBE490 Polymer Science (3 Credits)
The elements of the polymer chemistry and industrial polymerization, polymer structures and physics, thermodynamics of polymer solutions, polymer processing methods, and engineering applications of polymers.Also offered as: ENMA495.
Credit Only Granted for: CHBE490, ENCH490, or ENMA495.
Formerly: ENCH490.

CHBE495 Nanoparticle Aerosol Dynamics and Particle Technology (3 Credits)
NanoParticles (NA) (< 100 nm), and their science and technology play an important role in nature and industry. From air quality standards, nuclear reactor safety, inhalation therapy, workplace exposure, global climate change, to counterterrorism, aerosols play a central role in our environment. On the industrial side, NA plays an integral part of reinforcing fillers, pigments and catalysts, and the new emerging field of nanotechnology, they are the building blocks to new materials, which encompass, electronic, photonic and magnetic devices, and bio and chemical sensors.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.

CHBE496 Processing and Engineering of Polymers (3 Credits)
A comprehensive analysis of processing and engineering techniques for the conversion of polymeric materials into useful products. Evaluation of the performance of polymer processes, design of polymer processing equipment.
Credit Only Granted for: CHBE496 or ENCH496.
Formerly: ENCH496.

CHBE497 Protein Engineering (3 Credits)
This course will cover the fundamentals of protein engineering and its applications in medicine, chemical processes, and energy. Topics will include the structure and function of biological molecules, rational design and directed evolution, construction of protein and peptide libraries, protein screening platforms, methods for characterizing structure and function of biological molecules. Scientific literature will be used to highlight key discoveries and current work in protein engineering.
Prerequisite: BIOE120, CHBE302, and CHBE440; and permission of instructor.
Credit Only Granted for: CHBE497, BIOE489R, or ENCH 648P.

CHEM - Chemistry

CHEM401 Inorganic Chemistry (3 Credits)
An overview of basic concepts of the electronic structure of the elements, chemical bonding and reactivity, from simple diatomic molecules to coordination compounds. These are viewed from simple (Lewis) to the most comprehensive molecular orbital theory. Symmetry and group theory are used throughout the course.
Prerequisite: CHEM276 or CHEM271; and (CHEM247 or CHEM241).

CHEM403 Radiochemistry (3 Credits)
Radioactive decay; introduction to properties of atomic nuclei; nuclear processes in cosmology; chemical, biomedical and environmental applications of radioactivity; nuclear processes as chemical tools; interaction of radiation with matter.
Prerequisite: Must have completed one year of college chemistry and one year of college physics.

CHEM425 Instrumental Methods of Analysis (4 Credits)
Modern instrumentation in analytical chemistry. Electronics, spectroscopy, chromatography and electrochemistry.
Prerequisite: CHEM272 and CHEM271; or (CHEM276 and CHEM277).

CHEM441 Advanced Organic Chemistry (3 Credits)
An advanced study of the compounds of carbon, with special emphasis on molecular orbital theory and organic reaction mechanisms.
Prerequisite: Must have completed or be concurrently enrolled in CHEM481; and 1 course with a minimum grade of C- from (CHEM241, CHEM247). Also offered as: CHEM641.

CHEM460 Structure Determination Using Spectroscopic Methods (3 Credits)
The use of infrared, ultraviolet-visible, proton and carbon-13 nuclear magnetic resonance and mass spectroscopy for structure determination in organic chemistry.
Prerequisite: Must have completed CHEM243; or CHEM247; or (CHEM241 and CHEM242).
Formerly: CHEM660.

CHEM474 Environmental Chemistry (3 Credits)
The sources of various elements and chemical reactions between them in the atmosphere and hydrosphere are treated. Causes and biological effects of air and water pollution by certain elements are discussed.
Prerequisite: CHEM481.

CHEM481 Physical Chemistry I (3 Credits)
Thermodynamics and kinetics of chemical and molecular systems. Topics may include internal energy, heat, work, enthalpy, entropy, free energy, and spontaneity as well as reaction order, differential rate laws, integrated rate laws, and rate laws for multi-step processes.
Prerequisite: Minimum grade of C- in CHEM135; or minimum grade of C- in CHEM271 and CHEM272; or minimum grade of C- in CHEM276 and CHEM277. And minimum grade of C- in MATH141. And minimum grade of C- in PHYS260 and PHYS261; or minimum grade of C- in PHYS141.

CHEM482 Physical Chemistry II (3 Credits)
Quantum mechanical nature of atoms and molecules. Topics may include model systems for electronic, vibrational, rotational and translational energies as well as connections to molecular spectroscopy and thermal distributions.
Prerequisite: Minimum grade of C- in CHEM481.

CHEM483 Physical Chemistry Laboratory I (2 Credits)
An introduction to the principles and application of quantitative techniques in physical chemical measurements. Experiments will be coordinated with topics in CHEM481.
Prerequisite: Must have completed or be concurrently enrolled in CHEM481.

CHEM484 Physical Chemistry Laboratory II (2 Credits)
A continuation of CHEM 483. Advanced quantitative techniques necessary in physical chemical measurements. Experiments will be coordinated with topics in CHEM 482.
Prerequisite: CHEM481 and CHEM483; and must have completed or be concurrently enrolled in CHEM482.

CHEM498 Special Topics in Chemistry (3 Credits)

CHEM601 Structure and Bonding of Molecules and Materials (3 Credits)
Development of the tools necessary to use the knowledge of structure and bonding of molecules and solids in the practice of synthetic inorganic and materials chemistry. Several bonding models are covered, from the simple valence bond and ligand field models to a quantitative group theoretical treatment of molecular orbital theory and band structure descriptions of solids. Concepts of electron counting and oxidation state and ligand characteristics are revisited in terms of the more sophisticated bonding models. Finally, these models are used to analyze the reactivity, magnetic and spectroscopic properties of inorganic coordination compounds. Prior advanced inorganic and/or advanced quantum chemistry courses are not prerequisites.

CHEM602 Advanced Inorganic Chemistry II (3 Credits)
A continuation of CHEM 601 with emphasis on the application of contemporary spectroscopic techniques to inorganic problems.
Prerequisite: CHEM601; or permission of instructor.

CHEM608 Selected Topics in Inorganic Chemistry (1-3 Credits)
Topics of special interest and current importance.
Prerequisite: CHEM602 and CHEM601; or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits if content differs.

CHEM611 Professional Skills for New Graduate Students (1 Credit)
Covers a wide range of topics in professional development for new graduate students.
Restriction: Must be in one of the following programs (Chemistry (Master's); Biochemistry (Master's); Biochemistry (Doctoral); Chemistry (Doctoral)) ; and must be a new graduate student.

CHEM612 Scientific Presentations (1 Credit)
Workshops will cover all aspects of giving scientific presentations. Each student will give a presentation based oon the topic of his/her final paper in CHEM611. Presentations will be critiqued by peers and faculty members.
Prerequisite: CHEM611.

CHEM623 Optical Methods of Quantitative Analysis (3 Credits)
The quantitative applications of various methods of optical spectroscopy.
Prerequisite: CHEM482; or students who have taken courses with comparable content may contact the department.

CHEM624 Electrical Methods of Quantitative Analysis (3 Credits)
The use of conductivity, potentiometry, polarography, voltammetry, amperometry, coulometry, and chronopotentiometry in quantitative analysis.
Prerequisite: CHEM482; or students who have taken courses with comparable content may contact the department.

CHEM625 Separation Methods in Quantitative Analysis (3 Credits)
The theory and application for quantitative analysis of various forms of chromatography, ion exchange, solvent extraction, distillation, and mass spectroscopy.
Prerequisite: CHEM482; or students who have taken courses with comparable content may contact the department.

CHEM640 Problems in Organic Reaction Mechanisms (1 Credit)
A tutorial type course dealing with the basic description of the fundamentals of writing organic reaction mechanisms.

CHEM641 Organic Reaction Mechanisms (3 Credits)

CHEM647 Organic Synthesis (3 Credits)
The use of new reagents in organic reactions; multistep syntheses leading to natural products of biological interest; stereospecific and regiospecific reactions and their use in total synthesis.

CHEM648 Special Topics in Organic Chemistry (1-3 Credits)
Topics of special interest and current importance.
Repeatable to: 9 credits if content differs.

CHEM650 Problems in Organic Synthesis (1 Credit)
A tutorial type course dealing with mechanistic problems from the current literature of organic sysnthesis.

CHEM678 Special Topics in Environmental Chemistry (3 Credits)
In-depth treatment of environmental chemistry problem areas of current research interest. The topics will vary somewhat from year to year.
Prerequisite: CHEM474.
Repeatable to: 6 credits if content differs.

CHEM682 Chemical Kinetics and Dynamics (3 Credits)
The dynamics of atoms and molecules as they undergo chemical and physical change. Topics will be developed from a fundamental perspective and modern applications will be discussed. Topics include: chemical kinetics rate equations, atomic and molecular collisions; rate theories; atomic, molecular and chemical lasers; control of matter with light.
Prerequisite: CHEM482; or permission of instructor.
Restriction: Restricted to graduate students or advanced undergraduates with prerequisites.

CHEM684 Chemical Thermodynamics (3 Credits)

CHEM687 Statistical Mechanics and Chemistry (3 Credits)

CHEM688 Selected Topics in Physical Chemistry (2 Credits)

CHEM689 Special Topics in Physical Chemistry (3 Credits)

CHEM690 Quantum Chemistry I (3 Credits)

CHEM691 Quantum Chemistry II (3 Credits)

CHEM698 Literature Seminar in Chemistry (1 Credit)
Students will prepare and present a departmental seminar baseed on a topic in the current research literature.
Restriction: Must be in a major within CMNS-Chemistry & Biochemistry department.

CHEM699 Special Problems in Chemistry (1-6 Credits)
Laboratory experience in a research environment.
Prerequisite: One semester of graduate study in chemistry.
Restriction: Restricted to students in the non-thesis M.S. option.
Repeatable to: 6 credits.

CHEM703 Introduction to Nonequilibrium Statistical Physics (3 Credits)
Analysis and microscopic modeling of systems away from thermal equilibrium. Linear response theory, ergodicity, Brownian motion, Monte Carlo modeling, thermal ratchets, far-from-equilibrium fluctuation relations. Introduction to the theoretical tools of nonequilibrium phenomena and their application to problems in physics, chemistry and biology.
Prerequisite: PHYS603 or CHEM687; or permission of instructor.
Credit Only Granted for: CHPH703, CHPH718B, CHEM703, CHEM718B, PHYS703, OR PHYS798Z.
Formerly: CHEM718B.

CHEM705 Nuclear Chemistry (3 Credits)
Nuclear structure models, radioactive decay processes, nuclear reactions in complex nuclei, fission, nucleosynthesis and nuclear particle accelerators.

CHEM729 Special Topics in Geochemistry (1-3 Credits)
A discussion of current research problems.
Repeatable to: 6 credits if content differs.

CHEM799 Master's Thesis Research (1-6 Credits)

CHEM889 Seminar (1 Credit)

CHEM898 Pre-Candidacy Research (1-8 Credits)

CHEM899 Doctoral Dissertation Research (1-8 Credits)

CHIN - Chinese

CHIN401 Readings in Modern Chinese I (3 Credits)
Readings in history, politics, economics, sociology, and literature. Emphasis on wide-ranging, rapid reading, reinforced by conversations and compositions.
Prerequisite: CHIN302; or students who have taken courses with comparable content may contact the department. And must have taken a placement interview offered by the department for Non-majors.

CHIN402 Readings in Modern Chinese II (3 Credits)
Continuation of CHIN401.
Prerequisite: CHIN401; or students who have taken courses with comparable content may contact the department. And must have taken a placement interview offered by the department for Non-majors.

CHIN408 Selected Readings in Classical Chinese (3 Credits)
Selected readings in Classical Chinese, including important representative works of history, poetry, and parallel prose. Close attention is paid to matters of grammar and phonology in the readings. Content will differ each time this course is offered.
Prerequisite: CHIN321; and must have knowledge of Pinyin.
Repeatable to: 9 credits if content differs.

CHIN411 Business Chinese I (3 Credits)
Conversation, reading, and writing applicable to Chinese business transactions, social meetings, and meetings with government organizations, plus background material in English on professional business practices and social customs associated with business.
Prerequisite: CHIN402; or permission of ARHU-School of Languages, Literatures, and Cultures department. And must have taken a placement interview offered by the department for Non-majors.

CHIN412 Business Chinese II (3 Credits)
Continuation of CHIN411.
Prerequisite: CHIN402; or permission of ARHU-School of Languages, Literatures, and Cultures department. And must have taken a placement interview offered by the department for Non-majors.

CHIN415 Readings in Current Newspapers and Periodicals (3 Credits)
Reading of periodical literature on selected topics with discussions and essays in Chinese.
Prerequisite: CHIN402; or students who have taken courses with comparable content may contact the department. And must have taken a placement interview offered by the department for Non-majors.

CHIN418 Special Topics in Contemporary Chinese Fiction and Film (3 Credits)
Various approaches to the most recent textual productions of China and Taiwan. Taught in Chinese.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 12 credits if content differs.

CHIN422 Advanced Chinese Grammar (3 Credits)
Chinese sentence patterns studied and contrasted with English and in terms of current pedagogical as well as linguistic theories. Taught in English and Chinese.
Prerequisite: CHIN302; or permission of ARHU-School of Languages, Literatures, and Cultures department.

CHIN428 Selected Topics in Chinese Linguistics (3 Credits)
Undergraduate seminar in Chinese linguistics. Topics may include the ancient writing system, historical phonology, dialectology, prosody and rhyming, grammar and the history of the language as a whole. This course may be repeated with different content, and satisfies the linguistics requirement for the Chinese major. Students are expected to be in at least Third Year Chinese. Taught in English.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Restriction: Sophomore standing or higher.
Repeatable to: 12 credits if content differs.

CHIN429 Selected Topics in Chinese Studies (3 Credits)
In-depth study of a particular aspect of Chinese cultural, linguistic, literary studies. Specific topic to be announced when course is offered. Taught in English.
Prerequisite: CHIN315.
Repeatable to: 6 credits if content differs.

CHIN441 Traditional Chinese Fiction (3 Credits)
Major works of fiction from the 4th century tales of the marvelous through the 19th century Qing novel. Readings are in classical Chinese and English. Designed for students with advanced language skills. Taught in English.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

CHIN443 Cultural Histories of Medicine in China (3 Credits)
Investigates medical knowledge through traditional Chinese approaches to the body and beliefs about healing, including acupuncture, herbal medicine, prayer, ritual and folk medicine. Taught in English.
Restriction: Permission of department, School of Languages, Literatures and Cultures.

CHIN499 Directed Study in Chinese (1-3 Credits)
Readings in Chinese under faculty supervision.
Prerequisite: Permission of instructor.
Repeatable to: 6 credits if content differs.

CHIN602 The Language of Contemporary Chinese Audio Media (3 Credits)
Oral Chinese non-fiction in the high diglossic register, with emphasis on contextually and culturally appropriate interpretation of lexicon, style, and idiom. Conducted entirely in Chinese, intended for non-native speakers of the language pursuing professional levels of competence.
Prerequisite: Must have taken a placement test offered by the department.

CHIN603 The Language of Contemporary Chinese Written Fiction (3 Credits)
Chinese fiction writing, with emphasis on contextually and culturally appropriate interpretation of lexicon, style, and idiom in various genres. Conducted entirely in Chinese; intended for non-native speakers of the language pursuing professional levels of competence.
Prerequisite: Must have taken a placement test offered by the department.

CHIN611 Structure of the Chinese Language (3 Credits)
An overview of the basic linguistic characteristics of modern standard (Mandarin) Chinese, including phonology, morphology and syntax. Emphasis on the analysis of functional linguistic models and the development of student skills in critically appraising existing interpretations of Chinese language structure.

CHIN621 Chinese Historical Linguistics (3 Credits)
An introduction to the origin and development of the Chinese language, and its relationship to other languages.

CHPH - Chemical Physics

CHPH618 Special Projects in Chemical Physics (1-3 Credits)
Independent reading and study covering chemical physics subject areas not available in other courses.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

CHPH707 Advanced Laboratory - Photon Correlation Spectroscopy of Soft Matter (3-4 Credits)
The course is based at the Photon Correlation Spectroscopy facility, also known as Dynamic Light Scattering (DLS). The DLS has three state-of-the-art instruments for the characterization of nano-and meso-scale heterogeneities in soft-matter materials, such as nanoparticles, polymers, protein molecules in solution, gels, and microemulsions.
Repeatable to: 3 credits.

CHPH709 Seminar in Chemical Physics (1 Credit)
Current research and developments in chemical physics.

CHPH718 Special Topics in Chemical Physics (1-3 Credits)
A discussion of current research problems in chemical physics.
Repeatable to: 99 credits if content differs.

CHPH799 Master's Thesis Research (1-6 Credits)

CHPH898 Pre-Candidacy Research (1-8 Credits)

CHPH899 Doctoral Dissertation Research (1-8 Credits)

CLAS - Classics

CLAS409 Classics Capstone Seminar (3 Credits)
Comparative study of selected central aspects of both ancient Greek and Roman cultures as viewed from the standpoints of literary study, history, art history, and other fields as appropriate. Seminar format involving intensive student research.
Restriction: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.

CLAS419 The Classical Tradition (3 Credits)
Examination of the role of Greek and Roman civilization in shaping the arts and ideas of western culture.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: CLAS419 or CLAS420.
Formerly: CLAS420.

CLAS470 Approaches to Greek Mythology (3 Credits)
Ancient and modern approaches to understanding Greek myth as expression of human experience, including interpretations drawn from psychology, anthropology, and comparative mythology.
Prerequisite: CLAS170; or permission of ARHU-Classics department.

CLAS488 Independent Study in Classical Civilization (3 Credits)

CLAS499 Independent Study in Classical Languages and Literatures (1-3 Credits)

CLAS621 The Classical Tradition (3 Credits)
The role the classics have played in western thought, with particular attention to literature.

CLAS688 Special Topics in Classical Civilization (3 Credits)

CLAS699 Independent Study in Classical Civilization (1-3 Credits)

CLAS799 Master's Thesis Research (1-6 Credits)

CLFS - Chemical and Life Sciences

CLFS608 Seminar in Current Topics in Chemical and Life Science (1-3 Credits)
Seminar in current topics in the Life Sciences. Contact Program Director or instructor before registering.
Prerequisite: Two years of teaching experience; and CLFS510.
Restriction: Must be in Master of Chemical & Life Sciences (Master's) program; and permission of CMNS-Chemical & Life Sciences department.
Repeatable to: 6 credits if content differs.
Formerly: LFSC608.

CLFS609 Special Topics (1-3 Credits)
Individual instruction course. Contact Program Director or instructor before registering.
Prerequisite: Two years of teaching experience; and CLFS510.
Restriction: Must be in Master of Chemical & Life Sciences (Master's) program; and permission of CMNS-Chemical & Life Sciences department.
Repeatable to: 6 credits if content differs.
Formerly: LFSC609.

CLFS610 Natural Products Chemistry (3 Credits)
Foundations of natural products chemistry; how nature goes about making (biosynthesizing) these compounds and elements of enzymology and genomics relevant to production of these compounds; relevance of natural products chemistry as a driving force for drug discovery and innovation in biotechnology.
Restriction: Permission of CMNS-Chemical & Life Sciences department.
Credit Only Granted for: LFSC609D or LFSC610.
Formerly: LFSC609D.

CLFS619 Special Topics in Chemistry (1-3 Credits)
Topics of current interest and special importance.
Repeatable to: 9 credits if content differs.
Formerly: LFSC619.

CLFS620 Modern Molecular Genetics (3 Credits)
An overview of genetics including the genetic basis/components in prevalent diseases, genetically engineered organisms and foods, the importance of knowing the complete DNA sequence of organisms.

CLFS630 Principles of Transmission Genetics: A Historical and Modern Perspective (3 Credits)
Examines the origins of modern genetics, model genetic systems, and the role of chromosomes in vertical transmission of genetic information from parent to offspring. Classical gene mapping, population genetics and the various applications of modern genetics will also be studied.

CLFS640 Human Physiology (3 Credits)
Examination of the major organ system of the human body and of the neural and hormonal mechanisms responsible for their regulation and control.
Prerequisite: Two years of teaching experience; and CLFS510.
Restriction: Must be in Master of Chemical & Life Sciences (Master's) program; and permission of CMNS-Chemical & Life Sciences department.

CLFS655 The Chemistry and Applications of Electrochemical Cells (3 Credits)
Chemistry of electrochemical cells including the thermodynamic basis for the production of electrical energy by cells, the chemical reactions utilized by the most common cells, the manufacture of cells, and the application of cells in energy production.

CLFS660 Biodiversity and Conservation Biology (3 Credits)
Application of ecological and evolutionary principles to assess the impact of the human species on the environment and its inhabitants. Specific case studies are included to illustrate problems of bidiversityloss and actions required to reverse the trends.

CLFS665 Ecology and Global Change (3 Credits)
Ecological concepts across scales ranging from the individual, to populations, communities, ecosystems, and landscapes will be presented. Global change issues will encompass alteration of atmospheric trace gases, biogeochemistry cycles, land use changes, and introduction of non-native species to new habitats.
Credit Only Granted for: LFSC609C or LFSC665.
Formerly: LFSC609C.

CLFS680 Chemical Ecology (3 Credits)
An examination of the utilization of organic natural products by plants and animals for various life processes. Examples will include how materials are utilized for sexual selection, defense against predators, sexual attractants, and as natural herbicides and repellants.

CLFS690 Biochemistry (3 Credits)
An advanced overview of general biochemistry including a study of protein structure and their physical properties; how these properties relate to catalysis, regulation of catalysis and metabolic chemistry with respect to their relationship to physiological conditions.

CLFS710 Experimental Biology (6 Credits)
Participants develop skills in four areas of biological research while investigating a variety of biological systems. Those areas include: (1) iterative scientific methods, (2) basic laboratory techniques, (3) experimental design and analysis, and (4) critical evaluation of published research.
Formerly: LFSC710.

CLFS725 Experimental Design (2 Credits)
Experimental design and statistics for science teachers that emphasizes the underlying structure of data and how this affects the quality and reliability of experiments. Examines the nature of data, the methods for designing rigorous experiments, important experimental design formats, and the relationships between data structure and analysis. Course work focuses on the design and analysis of orginal experiments for a series of research problems.
Credit Only Granted for: LFSC710, LFSC719, or LFSC725.
Formerly: LFSC719.

CMLT - Comparative Literature

CMLT469 The Continental Novel (3 Credits)
The novel in translation from Stendhal through the existentialists, selected from literatures of France, Germany, Italy, Russia, and Spain.

CMLT479 Major Contemporary Authors (3 Credits)

CMLT488 Genres (3 Credits)
A study of a recognized literary form, such as tragedy, film, satire, literary criticism, comedy, tragicomedy, etc.
Repeatable to: 6 credits if content differs.

CMLT489 Major Writers (3 Credits)
Each semester two major writers from different cultures and languages will be studied. Authors will be chosen on the basis of significant relationships of cultural and aesthetic contexts, analogies between their respective works, and the importance of each writer to his literary tradition.

CMLT498 Selected Topics in Comparative Studies (3 Credits)

CMLT601 Problems in Comparative Studies (3 Credits)

CMLT639 Studies in the Renaissance (3 Credits)

CMLT649 Studies in Eighteenth Century Literature (3 Credits)
Studies in eighteenth century literature: as announced.
Repeatable to: 9 credits.

CMLT658 Studies in Romanticism (3 Credits)
Studies in romanticism: as announced.
Repeatable to: 9 credits.

CMLT679 Topics in Comparative Studies (3 Credits)
Seminar in modern and contemporary literature: as announced.
Repeatable to: 9 credits.

CMLT699 Independent Study (1-6 Credits)
Research and writing on specific readings on a topic selected by the student which is approved and supervised by a faculty member.
Restriction: Permission of instructor.
Repeatable to: 9 credits if content differs.

CMLT702 Cultures of Theory (3 Credits)
An exploration of the socio-historic, material, and cultural contexts of various theoretical practices and traditions.
Prerequisite: Must have completed an introductory course in critical theory. Also offered as: ENGL702.
Credit Only Granted for: CMLT702 or ENGL702.

CMLT788 Practicum in Comparative Studies (1-6 Credits)
Practical professional training for individuals and groups of students in supervised settings.
Prerequisite: Permission of ARHU-English department.
Repeatable to: 20 credits if content differs.

CMLT798 Critical Theory Colloquium (1 Credit)
An intensive advanced exploration of current problems and issues in critical theory.
Prerequisite: CMLT702 and CMLT701; or permission of instructor.
Repeatable to: 6 credits if content differs.

CMLT799 Master's Thesis Research (1-6 Credits)

CMLT898 Pre-Candidacy Research (1-8 Credits)

CMLT899 Doctoral Dissertation Research (1-8 Credits)

CMSC - Computer Science

CMSC402 Bioinformatic Algorithms and Methods for Functional Genomics and Proteomics (3 Credits)
An introduction to the fundamental concepts in the computational analysis of biological systems with applications to: functional genomics, population genetics, proteomics and epigenetics. Computational concepts covered: network and graph algorithms, combinatorial algorithms, machine learning, large data/network visualization, statistical modeling and inference, probabilistic graphical models, sparse methods in data analysis, numerical optimization. No prior knowledge of biology required.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; and permission of CMNS-Computer Science department.

CMSC411 Computer Systems Architecture (3 Credits)
Input/output processors and techniques. Intra-system communication, buses, caches. Addressing and memory hierarchies. Microprogramming, parallelism, and pipelining.
Prerequisite: Minimum grade of C- in CMSC330; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.
Credit Only Granted for: ENEE446 or CMSC411.

CMSC412 Operating Systems (4 Credits)
A hands-on introduction to operating systems, including topics in: multiprogramming, communication and synchronization, memory management, IO subsystems, and resource scheduling polices. The laboratory component consists of constructing a small kernel, including functions for device IO, multi-tasking, and memory management.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; and 1 course with a minimum grade of C- from (CMSC414, CMSC417, CMSC420, CMSC430, CMSC433, CMSC435, ENEE440, ENEE457).
Restriction: Permission of CMNS-Computer Science department; or must be in one of the following programs (Computer Science (Master's); Computer Science (Doctoral)).
Credit Only Granted for: CMSC412 or ENEE447.

CMSC414 Computer and Network Security (3 Credits)
An introduction to the topic of security in the context of computer systems and networks. Identify, analyze, and solve network-related security problems in computer systems. Fundamentals of number theory, authentication, and encryption technologies, as well as the practical problems that have to be solved in order to make those technologies workable in a networked environment, particularly in the wide-area Internet environment.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.
Credit Only Granted for: CMSC414, ENEE459C, or ENEE457.

CMSC417 Computer Networks (3 Credits)
Computer networks and architectures. The OSI model including discussion and examples of various network layers. A general introduction to existing network protocols. Communication protocol specification, analysis, and testing.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC420 Data Structures (3 Credits)
Description, properties, and storage allocation of data structures including lists and trees. Algorithms for manipulating structures. Applications from areas such as data processing, information retrieval, symbol manipulation, and operating systems.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC421 Introduction to Artificial Intelligence (3 Credits)
Areas and issues in artificial intelligence, including search, inference, knowledge representation, learning, vision, natural languages, expert systems, robotics. Implementation and application of programming languages (e.g. LISP, PROLOG, SMALLTALK), programming techniques (e.g. pattern matching, discrimination networks) and control structures (e.g. agendas, data dependencies).
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC422 Introduction to Machine Learning (3 Credits)
Machine Learning studies representations and algorithms that allow machines to improve their performance on a task from experience. This is a broad overview of existing methods for machine learning and an introduction to adaptive systems in general. Emphasis is given to practical aspects of machine learning and data mining.
Prerequisite: Minimum grade of C- in CMSC320, CMSC330, and CMSC351; and 1 course with a minimum grade of C- from (MATH240, MATH461); and permission of CMNS-Computer Science department.

CMSC423 Bioinformatic Algorithms, Databases, and Tools (3 Credits)
An introduction to the main algorithms, databases, and tools used in bioinformatics. Topics may include assembly and analysis of genome sequences, reconstructing evolutionary histories, predicting protein structure, and clustering of biological data. Use of scripting languages to perform analysis tasks on biological data. No prior knowledge of biology is assumed.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC424 Database Design (3 Credits)
Students are introduced to database systems and motivates the database approach as a mechanism for modeling the real world. An in-depth coverage of the relational model, logical database design, query languages, and other database concepts including query optimization, concurrency control; transaction management, and log based crash recovery. Distributed and Web database architectures are also discussed.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC425 Game Programming (3 Credits)
An introduction to the principles and practice of computer game programming and design. This includes an introduction to game hardware and systems, the principles of game design, object and terrain modeling, game physics, artificial intelligence for games, networking for games, rendering and animation, and aural rendering. Course topics are reinforced through the design and implementation of a working computer game.
Prerequisite: Minimum grade of C- in CMSC420.

CMSC426 Computer Vision (3 Credits)
An introduction to basic concepts and techniques in computervision. This includes low-level operations such as image filtering and edge detection, 3D reconstruction of scenes using stereo and structure from motion, and object detection, recognition and classification.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.

CMSC427 Computer Graphics (3 Credits)
An introduction to the principles of computer graphics. Includes an introduction to graphics displays and systems. Introduction to the mathematics of affine and projective transformations, perspective, curve and surface modeling, algorithms for hidden-surface removal, color models, methods for modeling illumination, shading, and reflection.
Prerequisite: MATH240; and minimum grade of C- in CMSC420; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC430 Introduction to Compilers (3 Credits)
Topics include lexical analysis, parsing, intermediate representations, program analysis, optimization, and code generation.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC433 Programming Language Technologies and Paradigms (3 Credits)
Programming language technologies (e.g., object-oriented programming), their implementations and use in software design and implementation.
Prerequisite: Minimum grade of C- in CMSC330; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.

CMSC434 Introduction to Human-Computer Interaction (3 Credits)
Assess usability by quantitative and qualitative methods. Conduct task analyses, usability tests, expert reviews, and continuing assessments of working products by interviews, surveys, and logging. Apply design processes and guidelines to develop professional quality user interfaces. Build low-fidelity paper mockups, and a high-fidelity prototype using contemporary tools such as graphic editors and a graphical programming environment (eg: Visual Basic, Java).
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC435 Software Engineering (3 Credits)
State-of-the-art techniques in software design and development. Laboratory experience in applying the techniques covered. Structured design, structured programming, top-down design and development, segmentation and modularization techniques, iterative enhancement, design and code inspection techniques, correctness, and chief-programmer teams. The development of a large software project.
Prerequisite: 1 course with a minimum grade of C- from (CMSC412, CMSC417, CMSC420, CMSC430, CMSC433); and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC436 Programming Handheld Systems (3 Credits)
Fundamental principles and concepts that underlie the programming of handheld systems, such as mobile phones, personal digital assistants, and tablet computers. Particular emphasis will be placed on concepts such as limited display size, power, memory and CPU speed; and new input modalities, where handheld systems differ substantially from non-handheld systems, and thus require special programming tools and approaches. Students will apply these concepts and principles in the context of an existing handset programming platform.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.

CMSC451 Design and Analysis of Computer Algorithms (3 Credits)
Fundamental techniques for designing efficient computer algorithms, proving their correctness, and analyzing their complexity. General topics include sorting, selection, graph algorithms, and basic algorithm design paradigms (such as divide-and-conquer, dynamic programming and greedy algorithms), lower bounds and NP-completeness.
Prerequisite: Minimum grade of C- in CMSC351; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC452 Elementary Theory of Computation (3 Credits)
Techniques are developed to determine the difficulty of a problem relative to a model of computation. Topics include Finite Automata, P, NP, decidability, undecidability, and communication complexity.
Prerequisite: Minimum grade of C- in CMSC351; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC456 Cryptology (3 Credits)
The theory, application, and implementation of mathematical techniques used to secure modern communications. Topics include symmetric and public-key encryption, message integrity, hash functions, block-cipher design and analysis, number theory, and digital signatures.
Prerequisite: (CMSC106, CMSC131, or ENEE150; or equivalent programming experience); and (2 courses from (CMSC330, CMSC351, ENEE324, or ENEE380); or any one of these courses and a 400-level MATH course, or two 400-level MATH courses). Or permission of instructor. Also offered as: MATH456, ENEE456.
Credit Only Granted for: MATH456, CMSC456, or ENEE456.

CMSC457 Introduction to Quantum Computing (3 Credits)
An introduction to the concept of a quantum computer, including algorithms that outperform classical computation and methods for performing quantum computation reliably in the presence of noise. As this is a multidisciplinary subject, the course will cover basic concepts in theoretical computer science and physics in addition to introducing core quantum computing topics.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, PHYS274); and 1 course with a minimum grade of C- from (CMSC351, PHYS373).
Restriction: Permission of CMNS-Computer Science department.
Additional Information: No previous background in quantum mechanics is required.

CMSC460 Computational Methods (3 Credits)
Basic computational methods for interpolation, least squares, approximation, numerical quadrature, numerical solution of polynomial and transcendental equations, systems of linear equations and initial value problems for ordinary differential equations. Emphasis on methods and their computational properties rather than their analytic aspects. Intended primarily for students in the physical and engineering sciences.
Prerequisite: MATH240 and MATH241; and (CMSC106 or CMSC131); and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program. Also offered as: AMSC460.
Credit Only Granted for: AMSC460, AMSC466, CMSC460, or CMSC466.

CMSC466 Introduction to Numerical Analysis I (3 Credits)
Floating point computations, direct methods for linear systems, interpolation, solution of nonlinear equations.
Prerequisite: MATH240 and MATH241; and (CMSC106 or CMSC131); and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program. Also offered as: AMSC466.
Credit Only Granted for: AMSC460, AMSC466, CMSC460, or CMSC466.

CMSC474 Introduction to Computational Game Theory (3 Credits)
Game theory deals with interactions among agents (either human or computerized) whose objectives and preferences may differ from the objectives and preferences of the other agents. It will also provide a comprehensive introduction to game theory, concentrating on its computational aspects.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Credit Only Granted for: CMSC474, ECON414, GVPT390 or GVPT399A.

CMSC475 Combinatorics and Graph Theory (3 Credits)
General enumeration methods, difference equations, generating functions. Elements of graph theory, matrix representations of graphs, applications of graph theory to transport networks, matching theory and graphical algorithms.
Prerequisite: MATH240 and MATH241; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program. Also offered as: MATH475.

CMSC488 Special Topics in Computer Science (1-3 Credits)
Seminar courses that allow students to pursue new and emerging areas of Computer Science.
Restriction: Permission of CMNS-Computer Science department.
Repeatable to: 6 credits if content differs.
Additional Information: Course may be used as electives for the undergraduate degree and minor.

CMSC498 Selected Topics in Computer Science (1-3 Credits)
An individualized course designed to allow a student or students to pursue a selected topic not taught as a part of the regular course offerings under the supervision of a Computer Science faculty member. In addition, courses dealing with topics of special interest and/or new emerging areas of computer science will be offered with this number. Selected topics courses will be structured very much like a regular course with homework, project and exams. Credit according to work completed
Restriction: Permission of CMNS-Computer Science department.

CMSC499 Independent Undergraduate Research (1-3 Credits)
Students are provided with an opportunity to participate in a computer science research project under the guidance of a faculty advisor. Format varies. Students and supervising faculty member will agree to a research plan which must be approved by the department. As part of each research plan, students should produce a final paper delineating their contribution to the field.
Restriction: Must be in one of the following programs (Computer Science; Engineering: Computer) ; and permission of CMNS-Computer Science department.

CMSC630 Foundations of Software Verification (3 Credits)
Topics in program verification. Operational semantics of programs. Preconditions and postconditions. Axiomatic proof systems and predicate transformers. Temporal logic and model checking. Process algebra, semantic equivalences and algebraic reasoning.
Prerequisite: CMSC330; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC631 Program Analysis and Understanding (3 Credits)
Techniques for static analysis of source code and modern programming paradigms. Analysis techniques: data flow analysis, program dependence graphs, program slicing, abstract interpretation. The meaning of programs: denotational semantics, partial evaluation. Advanced treatment of abstraction mechanisms: polymorphic types, operation overloading, inheritance, object-oriented programming and ML-like programming languages.
Prerequisite: CMSC330; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC634 Empirical Research Methods for Computer Science (3 Credits)
A graduate-level introductory course on empirical reseach methods for computer scientists. Experimental techniques for evaluating software systems and processes, human performance using interfaces, programming environments, and software engineering methods. Introduction to constructs and methods of measurements, qualitative and quantitative design, quasi-experimental and non-experimental design, baseline design, and statistical analysis.
Recommended: An introductory statistics class.
Restriction: Must be in Computer Science (Master's) program; or must be in Computer Science (Doctoral) program; or permission of instructor.
Credit Only Granted for: CMSC838G (Fall2005) or CMSC634.

CMSC641 Principles of Data Science (3 Credits)
An introduction to the data science pipeline, i.e., the end-to-end process of going from unstructured, messy data to knowledge and actionable insights. Provides a broad overview of what data science means and systems and tools commonly used for data science, and illustrates the principles of data science through several case studies.
Restriction: Must be in the Data Science Post-Baccalaureate Certificate of Professional Studies program; and permission of CMNS-Computer Science department.

CMSC642 Big Data Systems (3 Credits)
An overview of data management systems for performing data science on large volumes of data, including relational databases, and NoSQL systems. The topics covered include: different types of data management systems, their pros and cons, how and when to use those systems, and best practices for data modeling.
Restriction: Must be in the Data Science Post-Baccalaureate Certificate of Professional Studies program; and permission of CMNS-Computer Science department.

CMSC643 Machine Learning and Data Mining (3 Credits)
Provides a broad overview of key machine learning and data mining algorithms, and how to apply those to very large datasets. Topics covered include decision trees, linear models for classification and regression, support vector machines, neural networks and deep learning, online learning, recommendation systems, clustering and dimensionality reduction, and systems for large-scale machine learning.
Restriction: Must be in the Data Science Post-Baccalaureate Certificate of Professional Studies program; and permission of CMNS-Computer Science department.

CMSC644 Algorithms for Data Science (3 Credits)
Provides an in-depth understanding of some of the key data structures and algorithms essential for advanced data science. Topics include random sampling, graph algorithms, network science, data streams, and optimization.
Restriction: Must be in the Data Science Post-Baccalaureate Certificate of Professional Studies program; and permission of CMNS-Computer Science department.

CMSC651 Analysis of Algorithms (3 Credits)
Efficiency of algorithms, orders of magnitude, recurrence relations, lower-bound techniques, time and space resources, NP-complete problems, polynomial hierarchies, and approximation algorithms. Sorting, searching, set manipulation, graph theory, matrix multiplication, fast Fourier transform, pattern matching, and integer and polynomial arithmetic.
Prerequisite: CMSC451.

CMSC652 Complexity Theory (3 Credits)
This course will define what it means for a problem to be hard (or easy) in a variety of ways. The emphasis will be on natural problems. Topics may include NP-completeness, Sparse Sets, Graph Isomoprhism (why it is thought to not be NP-complete), Counting problems, and approximation problems.
Prerequisite: CMSC451 or CMSC452; or permission of instructor.
Credit Only Granted for: CMSC652 or CMSC858G.
Formerly: CMSC858G.

CMSC656 Introduction to Cryptography (3 Credits)
Introduction to modern cryptography. Topics include symmetric-key encryption, hash functions, message-authentication codes, block-cipher design, theoretical foundations, number theory, public-key encryption, and digital signatures.
Prerequisite: CMSC451, CMSC452, or CMSC456.
Credit Only Granted for: CMSC656 or CMSC858K.
Formerly: CMSC858K.

CMSC657 Introduction to Quantum Information Processing (3 Credits)
An introduction to the field of quantum information processing. Students will be prepared to pursue further study in quantum computing, quantum information theory, and related areas.
Prerequisite: Familiarity with complex numbers and basic concepts in linear algebra (e.g., eigenvalues, eigenvectors, Hermitian and unitary matrices) is required.
Credit Only Granted for: CMSC657 or CMSC858K.
Formerly: CMSC858K.
Additional Information: Previous background in quantum mechanics or theory of computation is not required.

CMSC660 Scientific Computing I (3 Credits)
Monte Carlo simulation, numerical linear algebra, nonlinear systems and continuation method, optimization, ordinary differential equations. Fundamental techniques in scientific computation with an introduction to the theory and software for each topic.
Prerequisite: Must have knowledge of C or Fortran. And CMSC466, AMSC466, AMSC460, or CMSC460; or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Also offered as: AMSC660.
Credit Only Granted for: AMSC660 or CMSC660.

CMSC661 Scientific Computing II (3 Credits)
Fourier and wavelet transform methods, numerical methods for elliptic partial differential equations, numerical linear algebra for sparse matrices, Finite element methods, numerical methods for time dependent partial differential equations. Techniques for scientific computation with an introduction to the theory and software for each topic. Course is part of a two course sequence (660 and 661), but can be taken independently.
Prerequisite: Must have knowledge of C or Fortran. And CMSC466, AMSC466, AMSC460, or CMSC460; or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Also offered as: AMSC661.
Credit Only Granted for: AMSC661 or CMSC661.

CMSC662 Computer Organization and Programming for Scientific Computing (3 Credits)
This course presents fundamentals issues of computer hardware, software, parallel computing, and scientific data management for programming for scientific computation.
Prerequisite: Must have Knowledge of C or Fortran. And CMSC466, AMSC466, AMSC460, or CMSC460; or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Also offered as: AMSC662.
Credit Only Granted for: AMSC662 or CMSC662.

CMSC663 Advanced Scientific Computing I (3 Credits)
In the sequence CMSC663, CMSC664 students work on a year-long individual project to develop software for a scientific task in a high perfomance computing environment. Lectures will be given on available computational environments, code development, implementation of parallel algorithms.Also offered as: AMSC663.
Credit Only Granted for: AMSC663 or CMSC663.

CMSC664 Advanced Scientific Computing II (3 Credits)
In the sequence CMSC 663, CMSC 664 students work on a year-long individual project to develop software for a scientific task in a high performance computing environment. Lectures will be given on code development and validation, parallel algorithms for partial differential equations, nonlinear systems, optimization.
Prerequisite: CMSC663.
Restriction: Permission of instructor. Also offered as: AMSC664.
Credit Only Granted for: AMSC664, or CMSC664.

CMSC666 Numerical Analysis I (3 Credits)
Interpolation and approximation, numerical integration, solution algorithms for nonlinear systems of equations, numerical optimization.
Prerequisite: CMSC466 or AMSC466; and MATH410. Also offered as: AMSC666.
Credit Only Granted for: AMSC666 or CMSC666.

CMSC667 Numerical Analysis II (3 Credits)
Numerical solution of initial value problems, numerical solution of boundary value problems, iterative methods for linear systems of equations, numerical methods for eigenvalue problems.
Prerequisite: AMSC666 or CMSC666. Also offered as: AMSC667.
Credit Only Granted for: AMSC667 or CMSC667.

CMSC701 Computational Genomics (3 Credits)
An introduction to the algorithms and heuristics used in the analysis of biological sequences. Includes an introduction to string matching and alignment algorithms, phylogenetic analysis, string reconstruction (genome assembly), and sequence pattern recognition (gene and motif finding). A particular emphasis will be placed on the design of efficient algorithms and on techniques for analyzing the time and space complexity of these algorithms. Computational concepts will be presented in the context of current biological applications. No prior knowledge of biology necessary.

CMSC702 Computational Systems Biology (3 Credits)
An introduction to the fundamental concepts in the computational analysis of biological systems with applications to: functional genomics, population genetics, interaction networks, epigenetics. Computational concepts convered: network and graph algorithms, machine learning, large data/network visualization, statistical modeling and inference, probabilistic graphical models, sparse methods in data analysis, numerical optimization. No prior knowledge of biology required.

CMSC703 Network Analysis and Modeling of Biological Systems (3 Credits)
An introduction to the computational network analysis and modeling of biological systems focusing on transcriptional, protein, signaling and metabolic networks (with primary emphasis on integrating the former within the latter). Computational methods studied for this type of analysis include: network and graph algorithms, network-based machine learning approaches, modeling dynamical systems, numerical optimization (linear, integer and quadratic programming) and a variety of other methods used to solve constraint based problems (primarily in the context of studying metabolic networks). These methods are complementary to those studied in CMSC701 and CMSC702.
Restriction: Must be in one of the following programs (Computer Science (Doctoral); Computer Science (Master's); Applied Mathematics and Scientific Computation (Doctoral); Applied Mathematics and Scientific Computation (Master's)) ; or permission of instructor.

CMSC711 Computer Networks (3 Credits)
Priciples, design, and performance evaluation of computer networks. Network architectures including the ISO model and local area networks (LANs). Communication protocols and network topology.
Prerequisite: CMSC412; or students who have taken courses with comparable content may contact the department.

CMSC712 Distributed Algorithms and Verification (3 Credits)
Study of algorithms from the distributed and concurrent systems literature. Formal approach to specifying, verifying, and deriving such algorithms. Areas selected from mutual exclusion, resource allocation, quiescence detection, election, Byzantine agreements, routing, network protocols, and fault-tolerence. Formal approaches will handle system specification and verification of safety, liveness, and real-time properties.

CMSC722 Artificial Intelligence Planning (3 Credits)
Automated planning of actions to accomplish some desired goals. Basic algorithms, important systems, and new directions in the field of artificial intelligence planning systems.
Prerequisite: CMSC421; or students who have taken courses with comparable content may contact the department; or permission of CMNS-Computer Science department.

CMSC723 Computational Linguistics I (3 Credits)
Fundamental methods in natural language processing. Topics include: finite-state methods, context-free and extended context-free models of syntax; parsing and semantics interpretation; n-gram and Hidden Markov models, part-of-speech tagging; natural language applications such as machine translation, automatic summarization, and question answering.
Prerequisite: CMSC421; or students who have taken courses with comparable content may contact the department; or permission of instructor. Also offered as: LING723, INST735.
Credit Only Granted for: CMSC723, LING723, or INST735.
Additional Information: May only receive PhD Comp. credit for CMSC723 or CMSC823, not both.

CMSC724 Database Management Systems (3 Credits)
Theoretical and implementation issues in advanced database systems. Topics include distributed databases, parallel databases, database client-server architectures, multimedia access methods, advanced query optimization techniques, data semantics and models, object-oriented databases, and deductive and expert database systems.
Restriction: Must be in one of the following programs (Computer Science (Master's); Computer Science (Doctoral)) ; or permission of instructor; or permission of CMNS-Computer Science department.

CMSC725 Geographical Information Systems and Spatial Databases (3 Credits)
Topics in geographic information systems and spatial databases. Integrates related results from databases, cartography, geography, computer graphics, file access methods, computational geometry, image processing, data structures, and programming languages. Topics include: cartographic modeling, principles of cartography, methods from computational geometry, principles of spatial databases, access methods, and spatial data structures. The architecture of some existing spatial databases and geographic information systems will be examined in greater detail.
Prerequisite: CMSC424 and CMSC420; or permission of instructor.

CMSC726 Machine Learning (3 Credits)
An introduction to modern statistical data analysis using machine learning techniques. The course quickly surveys elementary statistical models (decision trees, nearest neighbors and linear regression) and moves on to more complex algorithms such as support vector machines, boosting, neural networks, structured prediction, apprenticeship learning, online learning, bandits, recommender systems and reinforcement learning. Throughout an emphasis is placed on mathematical rigor.
Prerequisite: CMSC421; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC727 Neural Modeling (3 Credits)
Fundamental methods of neural modeling. Surveys historical development and recent research results from both the computational and dynamical systems perspective. Logical neurons, perceptrons, linear adaptive networks, attractor neural networks, competitive activation methods, error back-propagation, self-organizing maps, and related topics. Applications in artificial intelligence, cognitive science, and neuroscience.
Prerequisite: CMSC421; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC733 Computer Processing of Pictorial Information (3 Credits)
Input, output, and storage of pictorial information. Pictures as information sources, efficient encoding, sampling, quantization, approximation. Position-invariant operations on pictures, digital and optical implementations, the pax language, applications to matched and spatial frequency filtering. Picture quality, image enhancement and image restoration. Picture properties and pictorial pattern recognition. Processing of complex pictures; figure extraction, properties of figures. Data structures for pictures description and manipulation; picture languages. Graphics systems for alphanumeric and other symbols, line drawings of two- and three-dimensional objects, cartoons and movies.
Prerequisite: CMSC420.

CMSC734 Information Visualization (3 Credits)
Information visualization defined in relation to graphics, scientific visualization, databases, data mining, and human-computer interaction. Visualizations for dimensional, temporal, hierarchical and network data. Examines design alternatives, algorithms and data structures, coordinated views, and human factors evaluations of efficacy.
Prerequisite: CMSC434; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC737 Fundamentals of Software Testing (3 Credits)
Examine fundamental software testing and related program analysis techniques. In particular, the important phases of testing will be reviewed, emphasizing th significance of each phase when testing different types of software. Concepts include: test generation, oracles, prioritization and coverage, regression and mutation testing, and program analysis.
Prerequisite: CMSC435; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Formerly: CMSC838M.

CMSC740 Advanced Computer Graphics (3 Credits)
An introduction to the principles of computer graphics. Includes an introduction to graphics displays and systems, introduction to the mathematics of affine and projective transformations, perspective, curve and surface modeling, algorithms for hidden-surface removal, color models, methods for modeling illumination, shading, and reflection.
Prerequisite: MATH240 and CMSC420; or permission of instructor.

CMSC751 Parallel Algorithms (3 Credits)
A presentation of the theory of parallel computers and parallel processing. Models of parallel processing and the relationships between these models. Techniques for the design and analysis of efficient parallel algorithms including parallel prefix, searching, sorting, graph problems, and algebraic problems. Theoretical limits of parallelism, inherently sequential problems, and the theory of P-completeness.
Prerequisite: CMSC451; or students who have taken courses with comparable content may contact the department.

CMSC754 Computational Geometry (3 Credits)
Introduction to algorithms and data structures for computational problems in discrete geometry (for points, lines, and polygons) primarily in two and three dimensions. Topics include triangulations and planar subdivisions, geometric search and intersection, convex hulls, Voronoi diagrams, Delaunay triangulations, line arrangements, visibility, and motion planning.
Prerequisite: CMSC451 and CMSC420; or permission of instructor.

CMSC760 Advanced Linear Numerical Analysis (3 Credits)
Advanced topics in numerical linear algebra, such as dense eigenvalue problems, sparse elimination, iterative methods, and other topics.
Prerequisite: AMSC666 or CMSC666; or permission of instructor. Also offered as: AMSC600.
Credit Only Granted for: AMSC600 or CMSC760.
Formerly: CMSC770.

CMSC763 Advanced Linear Numerical Analysis (3 Credits)
Advanced topics in numerical linear algebra, such as dense eigenvalue problems, sparse elimination, iterative methods, and other topics.
Prerequisite: AMSC666 or CMSC666; or permission of instructor. Also offered as: AMSC763.
Credit Only Granted for: AMSC600, CMSC760, AMSC763, or CMSC763..
Formerly: CMSC760.

CMSC764 Advanced Numerical Optimization (3 Credits)
Modern numerical methods for solving uncontrained and constrained nonlinear optimization problems in finite dimensions. Design of computational algorithms and the analysis of their properties.
Prerequisite: MATH410; or permission of instructor. Also offered as: AMSC607.
Credit Only Granted for: AMSC607 or CMSC764.
Formerly: CMSC878O.

CMSC773 Computational Linguistics II (3 Credits)
Natural language processing with a focus on corpus-based statistical techniques. Topics inlcude: stochastic language modeling, smoothing, noisy channel models, probabilistic grammars and parsing; lexical acquisition, similarity-based methods, word sense disambiguation, statistical methods in NLP applications; system evaluation.
Prerequisite: LING723 or CMSC723; or permission of instructor. Also offered as: LING773.
Formerly: CMSC828R.
Additional Information: May only receive PhD Comp. credit for CMSC723 or CMSC823, not both.

CMSC798 Graduate Seminar in Computer Science (1-3 Credits)

CMSC799 Master's Thesis Research (1-6 Credits)

CMSC818 Advanced Topics in Computer Systems (1-3 Credits)
Advanced topics selected by the faculty from the literature of computer systems to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC828 Advanced Topics in Information Processing (1-3 Credits)
Advanced topics selected by the faculty from the literature of information processing to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC838 Advanced Topics in Programming Languages (1-3 Credits)
Advanced topics selected by faculty from the literature of programming languages to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC858 Advanced Topics in Theory of Computing (1-3 Credits)
Advanced topics selected by the faculty from the literature of theory of computing to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC878 Advanced Topics in Numerical Methods (1-3 Credits)
Advanced topics selected by the faculty from the literature of numerical methods to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC898 Pre-Candidacy Research (1-8 Credits)
Prerequisite: permission of instructor. Advanced topics selected by the faculty from the literature of applications of computer science to suit the interest and background of students. May be repeated for credit.
Restriction: Permission of instructor.

CMSC899 Doctoral Dissertation Research (1-8 Credits)

COMM - Communication

COMM400 Research Methods in Communication (3 Credits)
Philosophy of scientific method; role of theory; research ethics; empirical research methods (measurement, sampling, design, analysis).
Prerequisite: COMM250; and must have an introductory course in statistics.
Restriction: Must be in Communication program.

COMM401 Interpreting Strategic Discourse (3 Credits)
Principles and approaches for practical analysis of discourse designed to shape audience opinion.
Prerequisite: COMM250.
Restriction: Must be in Communication program.

COMM402 Communication Theory and Process (3 Credits)
Philosophical and conceptual analysis of communication theories.
Prerequisite: COMM250.
Restriction: Must be in Communication program.

COMM420 Theories of Group Discussion (3 Credits)
Current theory, research and techniques regarding small group process, group dynamics, leadership and decision-making.

COMM421 Communicating Leadership (3 Credits)
Examines the nature of leadership, theories of leadership from a communication perspective, relationships between leadership, authority, power, and ethics. Explores leadership responsibilities, commitments, and actions.

COMM422 Communication Management (3 Credits)
Communication policies, plans, channels, and practices in the management of the communication function in organizations.

COMM423 Communication Processes in Conferences (3 Credits)
Group participation in conferences, methods of problem solving, semantic aspects of language, and the function of conferences in business, industry and government settings.

COMM424 Communication in Complex Organizations (3 Credits)
Structure and function of communication within organizations: organizational climate and culture, information flow, networks and role relationships.

COMM425 Negotiation and Conflict Management (3 Credits)
Role of communication in shaping negotiation and conflict processes and outcomes.

COMM426 Conflict Management (3 Credits)
Role of communication in managing conflict processes.
Recommended: COMM425; and COMM250; and COMM402.

COMM427 Crisis Communication (3 Credits)
Explores theories and research related to communication before, during, and after a crisis. Students examine the fundamentals of organizational communication, crisis management, and strategic and crisis communication planning before examining case studies of a number of real-life crises: organizational crises, natural disasters, accidents, terrorism incidents, health crises, and major crises of credibility.
Credit Only Granted for: COMM398C or COMM427.
Formerly: COMM398C.

COMM435 Theories of Interpersonal Communication (3 Credits)
Major theoretical approaches and research trends in the study of interpersonal communication.
Prerequisite: COMM400; or permission of ARHU-Communication department.

COMM436 Interpersonal Arguing (3 Credits)
An examination of face to face arguing.
Prerequisite: COMM400 and COMM250.
Restriction: Must be in Communication program.
Credit Only Granted for: COMM436 or COMM498I.
Formerly: COMM498I.

COMM450 Ancient and Medieval Rhetorical Theory (3 Credits)
A survey of rhetorical theory in the ancient and medieval periods. Emphasis is placed on the theoretical problems that gave rise to its development within both periods. Authors include Isocrates, Plato, Aristotle, Cicero, Quintilian, Hermogenes, Martianus Capella, Aurelius Augustine, Alberic of Monte Cassino, Geoffrey of Vinsauf and Robert of Basevorn.
Prerequisite: COMM250.
Restriction: Must be in Communication program.
Credit Only Granted for: COMM450 or COMM650.

COMM451 Renaissance & Modern Rhetoric Theory (3 Credits)
A survey of rhetorical theory in the renaissance and modern periods. Emphasis is placed on the theoretical trends that dominate rhetorical thinking during both periods--especially in Great Britain. Authors include Wilson, Sherry, Rainolde, Day, Hyperius, Cox, Ramus, Talon, Bacon, Pascal, Fenelon, Sheridan, Campbell, Blair, and Whately.

COMM453 The Power of Discourse in American Life (3 Credits)
The potential of language forms and strategic discourse to create, perpetuate, and alter patterns of political and cultural behavior. The influence of contemporary political and cultural discourse on public understanding, public policy, and day-to-day life.

COMM454 Rhetoric of the 1960s (3 Credits)
Study of key rhetoric of the 1960s. Treats rhetoric of relevant Presidents and several protest movements including civil rights, anti-war, and women's liberation. Contrasts traditional modes of argument with alternative rhetorical forms.
Prerequisite: COMM401; or permission of ARHU-Communication department.
Restriction: Must not have completed COMM453 (Spring2003).

COMM455 Speechwriting (3 Credits)
The study of message strategies in order to research and develop effective speech texts appropriate to speakers and their audiences in various public contexts.

COMM458 Seminar in Political Communication (3 Credits)
The examination of special topics for and theories of political communication.
Prerequisite: COMM250.
Repeatable to: 6 credits if content differs.

COMM460 Public Life in American Communities, 1634-1900 (3 Credits)
Ways that Americans have used their voice to create public life. Focus is on the diverse social communities that have characterized American life and the place and characteristics of oral discourse in each.

COMM461 Voices of Public Leadership in the Twentieth Century (3 Credits)
Study of the use of speaking in the power struggles of the twentieth century. Focus is on important speakers of the century, their social and policy influence, and the struggle to expand the diversity of voices with power in the public sphere.

COMM468 Seminar in Mediated Communication (3 Credits)
The examination of special topics related to the study of mediated communication.
Prerequisite: COMM402, COMM450, COMM350, or JOUR350.
Restriction: Junior standing or higher.
Repeatable to: 6 credits if content differs.

COMM469 The Discourse of Social Movements (3 Credits)
Study of key social movements that have influenced American social and political life. In alternate years the Civil Rights Movement and the Rhetoric of Women's Suffrage and Abolitionism. Consideration of how groups excluded from or marginalized in American political life affect social change.
Recommended: COMM401.
Restriction: Junior standing or higher.
Repeatable to: 6 credits if content differs.

COMM470 Listening (3 Credits)
The principles of listening behavior.

COMM471 Public Communication Campaigns (3 Credits)
Diffusion theory and its implications for public communication campaigns.
Prerequisite: COMM200; or permission of ARHU-Communication department.

COMM472 Nonverbal Communication (3 Credits)
Nonverbal communication in human interaction theory and research on proxemics, kinesics and paralanguage as expression of relationship, affect and orientation within and across cultures.

COMM475 Persuasion (3 Credits)
Bases of persuasion, with emphasis on recent experimental developments in persuasion.

COMM476 Language, Communication, and Action (3 Credits)
The nature of communication as symbolic action. Topics include language, meaning, intention, understanding, and consequences of communication.

COMM477 Discourse Analysis (3 Credits)
Concepts of textual and discourse analysis applied to speech situations.

COMM478 Communication Colloquium (1 Credit)
Current trends and issues in the field of communication, stressing recent research methods. Recommended for senior and graduate student majors and minors in communication.
Repeatable to: 4 credits if content differs.

COMM482 Intercultural Communication (3 Credits)
The major variables of communication in an intercultural context: cultural, racial and national differences; stereotypes; values; cultural assumptions; and verbal and nonverbal channels.

COMM483 Senior Seminar in Public Relations (3 Credits)
Integration of theory, techniques and research methods into the planning and execution of public relations campaigns for specific organizations. Analysis of research on the case studies of public relations.
Prerequisite: COMM351 and COMM400.
Credit Only Granted for: COMM483 or JOUR483.
Formerly: JOUR483.

COMM488 Communication Portfolio Project (1 Credit)
Preparation of the professional communication portfolio.
Restriction: Senior standing; and must be in Communication program.
Repeatable to: 3 credits if content differs.

COMM489 Topical Research (1-3 Credits)
Individualized research projects conducted with a faculty sponsor.
Prerequisite: Permission of ARHU-Communication department.
Repeatable to: 6 credits if content differs.

COMM498 Seminar (3 Credits)
Present-day communication research.
Restriction: Permission of instructor; and senior standing.

COMM600 Empirical Research in Communication (3 Credits)

COMM601 Historical-Critical Research in Communication (3 Credits)
Intense study in critical and historical methodology as applicable to research in communication. Emphasis will be placed on the composition and the evaluation of historical-critical studies of significance in the field of rhetorical communication scholarship.
Formerly: SPCH601.

COMM602 Communication Theory (3 Credits)
Fundamental concepts, approaches, and problems in communication theory.
Restriction: Must be in one of the following programs (Communication (Master's); Communication (Doctoral)).

COMM604 Argumentation Theory (3 Credits)
Fundamental concepts, approaches, and problems in argumentation theory.

COMM605 Interpersonal Arguing (3 Credits)
Examination of interpersonal arguing. Topics include invention, form, and editing of argumentative content, presentation of such content in face-to-face conversation, and reaction to the content. Cognitive and other psychological approaches predominate, but some attention is given to rhetorical and philosophical traditions.

COMM606 Seminar in Communication Management (3 Credits)
Communication and public relations as a managed function of organizations are introduced. Students learn how managing communication contributes to organizational effectiveness. Using organizational theory, theories of Excellence in public relations and communication management, communication metrics and communication ethics, students build their communication strategic management skills beyond the programmatic level to the functional and organizational levels of decision-making.
Restriction: Restricted to GCPS (Z045) in Communication; or must be in Public Management-Executive Masters (Master's) program.

COMM607 Seminar in Communication Management Publics (3 Credits)
Research and analysis of publics and how the use of this information builds more effective relationships with strategic constituencies of organizations are emphasized. Students learn and apply to communication management problems the theories of audience segmentation, stakeholders, behavior of activist organizations, conflict resolution, environmental scanning, ethics of organization-public relationships and the situational theory of publics.
Restriction: Restricted to GCPS (Z045) in Communication; or must be in Public Management-Executive Masters (Master's) program.

COMM609 Fundamentals of Interpreting (1-6 Credits)
Develops a systematic, reflective approach to interpreting tasks in real-world settings and outlines the use of different modes of interpreting under professional working conditions. Provides an overview of interpreting skills with exercises to develop them, including focus on active listening and analysis, effective use of memory, and delivery of the target message. Interpreting strategies and techniques in both dialogue and formal consecutive settings are discussed and practiced in a range of interpreting domains. Includes sight translation.
Prerequisite: Students must complete an admissions test for first year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits.

COMM610 Introduction to Translation and Interpreting Studies (3 Credits)
Provides an overview of the interdisciplinary fields of Translation and Interpreting Studies and establishes relationships between scholarly study and professional practice. Examines how theories and concepts inform practice, guide to a higher level of competence, and address issues of interlingual, intercultural mediation in authentic, real-world settings both past and present. serves as a foundation course for reflective practice and portfolio work through action research methodology and process
Prerequisite: Students must complete an admissions test for first year courses; and permission of ARHU-Communication department.

COMM611 Semniar in Global Communcation Mangement (3 Credits)
Global Communication Management extends the theories of communication management developed in COMM606 and COMM607 to a global level. Students move beyond Western communication management assumptions to examine how practices of communication management differ in different national and/or cultural contexts. Students are challenged to build generic principles of communication management with specific applications that can be used and adapted in the differing countries and cultures of the world whether working in multinational corporations, national governments, or non-governmental organizations (NGO's).
Restriction: Restricted to GCPS (Z045) in Communication; or must be in Public Management-Executive Masters (Master's) program.

COMM618 Professional Communication: Rhetoric & Style (3 Credits)
Writing instruction in English for professional communicators with a focus on rhetoric, style, and grammar. Designed to teach English writing skills focused on message creation and organization, sentence structure, and language use, typologies of rhetorical genres, registers, and style, research skills, summary-writing skills, to editing skills, and vocabulary building in English writing.
Repeatable to: 6 credits.

COMM619 Consecutive Interpretation (2-6 Credits)
Builds upon the systematic, reflective approach to interpreting in real-world settings introduced in Fundamentals of Interpreting. Consecutive interpreting skills are consolidated through individual and group practice, and any remaining challenges related to consecutive interpreting sub-skills are identified and addressed. Stresses effective analysis, note-taking, and use of voice during exercises in sight translation, dialogue, and formal consecutive interpreting.
Prerequisite: COMM609; and must have completed an admissions test for first year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits.

COMM625 Negotiation (3 Credits)
Role of communication in shaping negotiation processes and outcomes.

COMM626 Conflict Management (3 Credits)
Role of communication in managing conflict processes.
Formerly: SPCH626.

COMM628 Organization Communication: Research and Intervention (3 Credits)
The role of the internal and external communication consultant as an organizational change-agent. Emphasis upon data gathered to facilitate the communication development of the organization.
Prerequisite: COMM424; or permission of instructor.
Repeatable to: 6 credits if content differs.
Formerly: SPCH628.

COMM629 Introduction to Simultaneous Interpretation (1 Credit)
Builds upon the overview of the simultaneous mode in Fundamentals of Interpreting by reviewing the relationship between consecutive and simultaneous skills and introducing work in the booth. Challenges of simultaneous interpreting, including split attention, ear-voice span, and voice and microphone technique are addressed. Participants become familiar with the booth and exercises required to build simultaneous skills. Role and use of portable equipment in professional settings are discussed. Recommended as preparation for the M.A. entrance examination.
Prerequisite: Admissions test for Graduate Certificate in Interpreting; and COMM609; and permission of ARHU-Communication department.
Recommended: COMM619.
Repeatable to: 3 credits if content differs.

COMM630 Seminar in Public Relations Management (3 Credits)
Relationship of public relations management to organizational structure and communication functions. Objectives, planning, staffing, budgeting, administering, and evaluation of public relations programs.
Credit Only Granted for: COMM630 or JOUR630.
Formerly: JOUR630.

COMM631 Seminar in Public Relations Publics (3 Credits)
Analysis of public relations programs aimed at organizational publics. Media, issue-related, community, employee, governmental, consumer, financial, and student/educator publics. Theories of the nature of publics, communication behavior of publics, and effects of public relations programs aimed at different publics.
Credit Only Granted for: COMM631 or JOUR631.
Formerly: JOUR631.

COMM633 Global Public Relations (3 Credits)
Application of principles of public relations to countries or regions with different cultures, political systems, economic systems, levels of development, media systems, and levels of activism.
Credit Only Granted for: COMM633 or JOUR633.
Formerly: JOUR633.

COMM637 Professional Practice Forum in Translation: Career Portfolio and Exams (1 Credit)
Serves as final preparation for entry into the profession through development of career portfolio to meet summative degree requirement and development of strategies for gaining work as a professional translator. Prepares participants for degree examinations and employer tests through the review of previous exam material and employer testing requirements. Serves as venue for degree examinations, career goal setting and planning for future employment. Participants present and defend career portfolio as summative requirement for MA in translation; MA in Trans. and Localization Project.
Prerequisite: Admissions test for second year courses; and (COMM659 and COMM679); and permission of ARHU-Communication department.

COMM638 Professional Communication: Rhetoric & Voice (3 Credits)
A skills-based course in speaking instruction in English for professional communicators with a focus on public speaking, voice, diction, and pronunciation. Focuses on developing public speaking, voice, diction, and pronunciation skills. Designed to teach message creation and organization, sentence structure, and language use, vocal qualities designed to enhance proper pronunciation, breathing, and articulation skills, register variation, listening skills, English vocabulary, audience adaptation skills with attention to cultural distinctions, presentational skills with visual aids, and interpretive skills.
Repeatable to: 6 credits.

COMM639 Fundamentals of Translation (1-6 Credits)
Develops a systematic, reflective approach to translation involving both the written and spoken word. Provides an overview of domains of translation, associated text categories and translation tasks. Develops strategies to identify, analyze and resolve translation challenges in specific, authentic,real-world contexts. Working with a series of current texts, explores general translation concepts and language-specific strategies. Includes sight translation exercises and introduction to translation resources and computer tools used in the translators workplace.
Prerequisite: Admissions test for first year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits if content differs.

COMM641 Introduction to Computer-Assisted Translation (1 Credit)
Introduces the use of computer-assisted translation tools to support large-scale translation projects and streamline translation processes. Focuses on industry software products that utilize translation memory and terminology management systems. Discusses the role of tools in the entire translation process from pre- to post-editing.
Prerequisite: Admissions test for first year courses; and COMM639; and permission of ARHU-Communication department.

COMM649 Translation for Specific Domains (2-6 Credits)
Builds upon the systematic, reflective approach introduced in Fundamentals of Translation by addressing the development of translation skills required for specialization in specific domains. In written and sight translation exercises include researching specialized subject material, developing and maintaining terminology, and consulting experts in the field. Includes authentic, real-world translation projects in translation teams. Overview of computer-assisted translation tools and continued work on sight translation enable higher levels of productivity under time constraints.
Prerequisite: Admissions test for first year courses; and COMM639; and permission of ARHU-Communication department.
Repeatable to: 8 credits if content differs.

COMM652 Contemporary Rhetorical Theory (3 Credits)
A study of twentieth century theories of rhetoric. Special attention will be devoted to Richard Weaver, Kenneth Burke, Lloyd Bitzer, Ernest Bormann, Walter Fisher, and the continental theorists of communication such as Chaim Perelman and Jurgen Habermas.
Formerly: SPCH652.

COMM655 Seminar in Speechwriting (3 Credits)
Theoretical and practical aspects of speechwriting at an advanced level.
Formerly: SPCH655.

COMM657 Professional Practice Forum in Interpreting: Career Portfolio and Exams (1 Credit)
Serves as final preparation for entry into the profession through development of strategies for gaining work as a professional translator. Prepares participants for degree examinations and employer tests through the review of previous exam material and employer testing requirements. Serves as venue for degree examinations, career goal setting and planning for future employment. Participants present and defend career portfolio and summative requirement for degree.
Prerequisite: COMM719, COMM769, and COMM729; and admissions test for second-year courses; and permission of ARHU-Communication department.

COMM659 Translation for Language-Specific Markets (1-3 Credits)
Builds translation skills to a highly professional level by developing autonomy in completing authentic, real-world translation projects based upon the reflective approach developed in the first-year curriculum. Develops one or more specializations. Completion of individual and group projects covering all aspects of professional translation from subject matter research, terminology work, and use of computer-assisted translation tools. Sight translation and timed exercises to increase production and meet deadlines.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits.

COMM661 Communication and Social Change (3 Credits)
Place of rhetoric as the union of the moral and historical in moments of social definition. Reviews theories of discourse in social change including political change, social movements, consciousness change, and more global change. Application to contemporary change.

COMM668 Risk Communication (3 Credits)
Principles and approaches to risk communication. Emphasis is placed on theoretical trends in risk communication and application to industry. Topics include how to be an effective source of risk communication, understanding audiences, handling the media and designing messages.
Prerequisite: Permission of ARHU-Communication department.
Repeatable to: 9 credits if content differs.

COMM669 Professional Practice Forum in Translation: Practicum (1-3 Credits)
Provides opportunities to complete real-world translation projects on campus and in the public service, legal, business, and political communities as translators, project managers and translators/reviewers working on group projects. Collaboration with participants in the interpreting practicum is also sought to prepare multilingual texts for practicum events and familiarize participants with conference translation. Complements Translation for Specific Markets, and practicum projects are included in course and career reflective practice portfolios. Requires independent study plan agreed with course instructor.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 9 credits if content differs.

COMM670 Seminar in Listening Behavior (3 Credits)
A study of research in and measurement of listening behavior.
Prerequisite: COMM470; or permission of instructor.
Formerly: SPCH670.

COMM679 Professional Practice Forum in Translation: Workplace Processes and Procedures (1 Credit)
Provides in-depth exploration of processes and procedures in public service, legal, and political settings requiring translation services. Prepares for translation in real-world settings by discussing procedures across sectors and institutions, enabling informed career plans and choices. Discusses ethics, professional conduct and business practices. Reinforces identity as a professional translator, develops specializations, and pursues professional and career development opportunities through interaction with members of the profession, professional organizations, and institutions in the language industry.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 3 credits if content differs.

COMM680 Communication Programs in Education and Training (3 Credits)
An analysis of instructional development in communication. Instructional objectives, strategies and evaluation are applied to educational, corporate and industrial training programs.
Formerly: SPCH680.

COMM681 Communication Issues in Human Resource Development (3 Credits)
Research in and theory of contemporary communication issues in the human resource development of governmental, corporate, business organizations.
Formerly: SPCH681.

COMM683 Intercultural Communication Theory (3 Credits)
An in-depth coverage of the essential theories of intercultural communication is provided.

COMM686 Teaching Communication (1 Credit)
Principles of effective teaching--content and process--in the college communication classroom.
Formerly: SPCH686.

COMM687 Professional Development in the Communication Discipline (1 Credit)
Knowledge and skills required for advancement as an academic professional in the communication discipline. Topics include types of academic institutions and posts, elements of academic performance, documentation of professional qualifications, how academic posts are secured, processes associated with tenure and promotion, processes of academic publication and history of the discipline.

COMM688 Communication Field Experience (1-6 Credits)
Applications of communication principles and research in professional communication settings.
Restriction: Permission of instructor.
Formerly: SPCH688.

COMM698 Special Problems in Communication (1-3 Credits)

COMM700 Introduction to Graduate Study in Communication (3 Credits)
Basic skills in communication research.
Restriction: Must be in Communication (Doctoral) program.
Formerly: SPCH700.

COMM701 Quantitative Methods in Communication Research (3 Credits)
Logic and methods of quantitative data collection and statistical analysis as applied to communication studies. Research strategies for communications: experimentation, survey research, field research, and content analysis.
Prerequisite: COMM700.
Formerly: SPCH701.

COMM702 Intermediate Quantitative Data Analysis in Communication Research: The General Linear Model (3 Credits)
Data analysis in current communication research. Techniques include regression, correlation, factor analysis, matrix algebra, covariance structure, and path diagrams. Students will be expected to have completed a methods course and a statistics course or tested equivalent competencies.
Prerequisite: COMM700; or permission of instructor.
Formerly: SPCH702.

COMM703 Advanced Quantitative Data Analysis in Communication Research: Structural Equation Models (3 Credits)
Model evaluation and theory construction in communication research. Causal systems in current communication research: recursive, nonrecursive, and unobserved variable models. Students must have a dissertation research project requiring quantitative methods.
Prerequisite: COMM702.
Restriction: Permission of instructor.
Formerly: SPCH703.

COMM708 Professional Communication: Rhetoric and Context (3 Credits)
A skills-based course in speaking and writing in English for professional communicators adapting to a diversity of contexts, including business, health, law, politics, and science. Focus on diversifying the different contexts in which speaking and writing take place. Designed to develop an ability to adapt messages to a diversity of professional communication contexts, address the role of culture in adapting messages to a diversity of professional communication contexts, hone English speaking and writing skills based on a diversity of language registers, gain experience working with technical vocabulary, enhance analytical skills, strengthen research skills, enhance critical thinking skills, develop software technology skills.
Repeatable to: 6 credits.

COMM710 Translation and Localization Project Management (3 Credits)
Introduces basic principles of project management in the translation industry based upon globalization and localization processes for software, websites, and other translation-driven products. Focuses on information technology and workflow in large-scale multilingual projects. Examines planning, execution, and evaluation processes grounded in best practices and standards of the translation and localization industry.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.

COMM711 Historical/Critical Methods in Communication Research (3 Credits)
Methods for historical and critical research in communication. Formulation of significant research questions, systematic collection of bibliographic and phenomenal information, formulating substantial claims, organizing and writing research for disciplinary outlets.
Prerequisite: COMM700; or permission of instructor.
Formerly: SPCH711.

COMM712 Advanced Historical/Critical Methods in Communication Research (3 Credits)
Critical assessment of qualitative approaches to communication. Introduction to significant schools of historical and critical research. Advanced techniques for inquiry and manuscript preparation. Students must have dissertation research project requiring historical or critical method.
Prerequisite: COMM711.
Restriction: Permission of instructor.
Formerly: SPCH712.

COMM713 Translation Technology (3 Credits)
Builds upon the principles outlined in Introduction to Computer-Assisted Translation to develop comprehensive knowledge of the current and future roles of technology in translation processes involving both the spoken and the written word, including use of widely available software tools and systems for terminology management, translation memory, and machine translation. Students carry out projects using translation technology, enabling them to apply newly acquired knowledge in applied contexts. Examination of case studies highlights how translation technology is leveraged across public and private sector organizations and the latest developments in the field.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.

COMM714 Introduction to Qualitative Methods in Communication Research (3 Credits)
Methods for field research in communication including interiewing, ethnographic and participant intervention, focus groups, and content analysis. Formulation of significant research questions, systematic collection of field data, formulating substantial claims from the research, organizing and writing research from disciplinary outlets.
Restriction: Permission of instructor.

COMM715 Advanced Qualitative Methods in Communication Research (3 Credits)
Advanced data analysis of qualitative data in Communication research. In-field research and techniques for analysis of data from in-field work.
Prerequisite: COMM714; or students who have taken courses with comparable content may contact the department.

COMM718 Practicum in Research Proposal and Design (3 Credits)
Development of research proposal through research team interaction. In different semester the course focuses on different subdisciplines of communication.
Repeatable to: 6 credits.
Credit Only Granted for: COMM718 or JOUR632.
Formerly: JOUR632.

COMM719 Advanced Consecutive Interpretation (1-3 Credits)
Builds consecutive interpreting skills to a highly professional level by sharpening listening, processing, memory, note-taking, and delivery skills, enabling interpretation of highly complex material requiring particular attention to nuance, tone, and style. Includes dialogue and monologue interpreting exercises with specialized subject material. Participants emerge from the course as reflective practitioners with the simultaneous interpreting skills required to perform competently in real-world settings.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits if content differs.

COMM720 Seminar in Small Group Communication (3 Credits)
Small group communication theory, research, and applications.
Formerly: SPCH720.

COMM724 Seminar in Organizational Communication (3 Credits)
Theories and problems of human communication within, between, and/or among formal organizations will be emphasized.
Restriction: Permission of instructor.
Formerly: SPCH724.

COMM729 Simultaneous Interpretation (1-3 Credits)
Builds upon the discussion of the simultaneous mode and exercises in Introduction to Simultaneous Interpreting by reviewing the relationship between consecutive and simultaneous skills and introducing work in the booth in a series of progressive exercises. Addresses challenges such as coordination of split attention, ear-voice span, memory and delivery / presentation. Reinforces principles of collegial teamwork and good microphone technique in the booth. Enhances preparation skills required for interpretation of specialized subject matter.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits if content differs.

COMM730 Seminar in Health Communication (3 Credits)
Communication processes in health care and promotion.
Formerly: SPCH730.

COMM738 Seminar in Mediated Communication (3-12 Credits)
The examination of special topics related to the study of mediated communication.
Restriction: Permission of instructor.
Repeatable to: 12 credits if content differs.

COMM739 topics in Public Relations (3 Credits)
Seminar on specialized areas of scholarly research in public relations or on the practice of public relations in specialized organizational settings.
Repeatable to: 6 credits if content differs.
Formerly: JOUR739.

COMM748 The Rhetoric of the Presidency (3 Credits)
The study of the historical and contemporary rhetoric of the presidency in appropriate historical and political contexts. Scholarship related to public address studies and theories of the presidency will be featured.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: COMM748 or COMM768.
Formerly: COMM768.

COMM749 Advanced Simultaneous Interpretation (1-3 Credits)
Builds simultaneous interpreting skills to a highly professional level, including highly complex material requiring particular attention to nuance, tone, and style. Resolves any remaining challenges of split attention, ear-voice span, memory and delivery / presentation. Introduces simultaneous interpretation with text, based upon sight translation techniques. Participants emerge from the course as reflective practitioners with the simultaneous interpreting skills required to perform competently in real-world settings.
Prerequisite: COMM729; and admissions test for second-year courses; and permission of ARHU-Communication department.
Repeatable to: 4 credits if content differs.

COMM758 Seminar in Rhetorical Theory (3 Credits)
Examination of selected theories of style drawn from the fields of rhetoric and literature, and analysis of model speeches.
Prerequisite: COMM460, COMM461, or COMM450.
Repeatable to: 12 credits if content differs.
Formerly: SPCH758.

COMM759 Professional Practice Forum in Interpreting: Practicum (1-3 Credits)
Provides opportunities to interpret consecutively and simultaneously in real-world settings on campus and in the public service, legal, business, and political communities. Develops team leader skills by organizing and convening an event or series of events (conference, debate, or negotiation), selecting topics and delegates, and preparing speeches and arguments to deliver and interpret. Collaboration with participants in M.A. translation courses is sought. Requires independent study plan agreed with course instructor.
Prerequisite: Admissions test for second-year courses; and permission of ARHU-Communication department.
Repeatable to: 9 credits if content differs.

COMM760 Seminar in Political Communication (3 Credits)
A blend of theory and practice to integrate rhetorical-critical theory and empirical methods with politics. Practitioners in political communication will be drawn in as resource persons. Students will map the communication strategy for candidates and analyze actual campaign strategies.
Formerly: SPCH760.

COMM762 The Rhetoric of Political Institutions (3 Credits)
The role of discourse in major political institutions is examined. The specific institutional focus may change from instructor to instructor. Examples include Congress, the courts, or the state legislatures.

COMM768 Seminar in Public Address (3 Credits)
An in-depth study of national and international speakers and issues throughout the history of the spoken word. Emphasis will be placed upon the application of rhetorical principles to the analysis of world speakers and their speeches.
Repeatable to: 12 credits if content differs.
Formerly: SPCH768.

COMM769 Professional Practice Forum in Interpreting: Workplace Processes and Procedures (1-2 Credits)
Provides in-depth exploration of processes and procedures in public service, legal, and political settings where interpreting services are commonplace. Enables students to make informed career plans and choices. Empowers participants by helping to establish and reinforce identity as a professional interpreter, develop specializations, and pursue professional and career development opportunities through interaction with members of the profession, professional organizations, and institutions in the language industry.
Prerequisite: Admissions test for second-year courses; and permission of ARHU-Communication department.
Repeatable to: 3 credits if content differs.

COMM775 Seminar in Persuasion and Attitude Change (3 Credits)
This seminar will concentrate on the problem of making message strategy decisions. Course content will consist of study of both theoretical and empirical research on attitude and attitude change in persuasive communication.
Prerequisite: Permission of ARHU-Communication department.
Formerly: SPCH775.

COMM776 Seminar in Interpersonal Communication (3 Credits)
Interpersonal communication theory, research, and practice.
Formerly: SPCH776.

COMM777 Persuasive Message Strategies (3 Credits)
Examines which persuasive messages are effective to change attitudes and behavior at what times and with what people.
Credit Only Granted for: COMM698P or COMM777.
Formerly: COMM698P.

COMM779 Seminar: Special Topics in Persuasion and Attitude Change (3 Credits)
This seminar explores special topic areas with the study of persuasion and attitude change, such as social cognition, humor, message production,and cognitive oscillation.
Recommended: COMM775.
Repeatable to: 9 credits if content differs.

COMM783 Seminar in Intercultural Communication (3 Credits)
Concentrates on theoretical and methodological issues in intercultural communication research.
Credit Only Granted for: COMM682 or COMM783.
Formerly: COMM682.

COMM789 Seminar: Special Topics in Intercultural Communication (3 Credits)
Explores special topic areas within the study of intercultural communication, such as culture and conflict, intercultural negotiation, cross-cultural relationships.
Recommended: COMM683.
Repeatable to: 9 credits if content differs.

COMM798 Independent Study (1-3 Credits)
An individual course designed for intensive study or research of problems in communication.
Restriction: Permission of instructor.
Formerly: SPCH798.

COMM799 Master's Thesis Research (1-6 Credits)

COMM879 Special Research Problems in Persuasion and Attitude Change (1-4 Credits)
Directed team and individual research projects.
Prerequisite: Permission of ARHU-Communication department.
Repeatable to: 9 credits if content differs.

COMM888 Doctoral Practicum in Communication (3-9 Credits)
Analysis of professional activity through personal observation. Evaluation of the purpose, process, effectiveness, and efficiency of professional activity. Recommendations for training and further research.
Repeatable to: 9 credits if content differs.
Formerly: SPCH888.

COMM889 Doctoral Tutorial in Communication (3-9 Credits)
Individual research in communication.
Repeatable to: 9 credits if content differs.
Formerly: SPCH889.

COMM898 Pre-Candidacy Research (1-8 Credits)

COMM899 Doctoral Dissertation Research (1-8 Credits)

CONS - Sustainable Development & Conservation Biology

CONS608 Seminar in Sustainable Development and Conservation Biology (1-4 Credits)
Special topics and current literature in conservation biology and sustainable development.
Repeatable to: 6 credits if content differs.

CONS609 Special Topics in Conservation Biology (1-3 Credits)
Lectures, experimental courses and other special instructions in various subjects in conservation biology.
Repeatable to: 6 credits if content differs.

CONS670 Conservation Biology (3 Credits)
Conservation in the Anthropocene means conserving biodiversity and ecosystem function in the midst of climate change, habitat loss, overexploitation, altered nutrient cycling, and invasive species with protected areas and reserve networks, ecosystem restoration, and other biodiversity conservation and management schemes.Also offered as: MEES670.
Credit Only Granted for: CONS670 or MEES670.

CONS680 Problem Solving in Conservation/Development (4 Credits)
Students will be exposed to current problems in conservation and development through great lectures, field trips, interviews and appropriate literature. Working in teams, students will formulate recommendations based on a synthesis of biological, economic and policy considerations.

CONS798 Research Papers in Sustainable Development and Conservation Biology (1-4 Credits)
Work on the required scholarly paper.
Restriction: Must be in Sustainable Development & Conservation Biology (Master's) program.
Repeatable to: 4 credits if content differs.

DANC - Dance

DANC405 Dance Education II: Education & Policy (3 Credits)
Curricula in dance in K-12 settings, classroom management, assessment/grading, and best practices in dance education in public schools. Current research and policy issues are included. This course counts towards teacher certification in the State of Maryland.
Restriction: Permission of ARHU-Dance department.

DANC409 Contact Improvisation (2 Credits)
Discovery and cultivation of the principles and skills of Contact Improvisation dance technique.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 4 credits.
Credit Only Granted for: DANC489C or DANC409.

DANC410 Technical Theater Production for Dance (3 Credits)
A study of the theoretical principles of production and the practical application of those principles to the presentation of dance works.
Prerequisite: DANC210; or students who have taken courses with comparable content may contact the department; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC420 Partnering (2 Credits)
Elements of contemporary partnering including weight sharing, counter balancing, momentum/leverage, lifting and moving responsively.
Restriction: Permission of ARHU-Dance department.

DANC429 Advanced Ballet Technique II (1 Credit)
Intensive work in ballet technique for the professionally-oriented dancer.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 3 credits.

DANC448 Modern Dance V (3 Credits)
Complex phrases of modern dance movement with emphasis on articulation and expression.
Prerequisite: DANC349; and must audition.
Repeatable to: 6 credits.

DANC449 Modern Dance VI (3 Credits)
Continuation of DANC448.
Prerequisite: DANC448; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC466 Laban Movement Analysis (3 Credits)
Introduction to Rudolf Laban's system of qualitative movement analysis in relation to understanding personal movement style. Application to dance performance, teaching, composition and research.

DANC468 Dance Repertory (3 Credits)
Form, content, music, design and performance of modern dance works.
Prerequisite: DANC349; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits if content differs.

DANC469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

DANC479 Advanced Practicum in Dance (1-3 Credits)
Advanced level performing experience for the student dancer who has developed an advanced professional level of competence.
Repeatable to: 6 credits.

DANC483 History of Dance II (3 Credits)
The development of dance from the Renaissance period to the present time and the relationship of dance forms to patterns of culture.
Prerequisite: DANC200.

DANC485 Seminar in Dance (3 Credits)
Individual research leading to a presentation with written documentation of the process, serving as a culmination of undergraduate study for dance majors.
Prerequisite: DANC483.
Restriction: Must be in Dance program; and senior standing.

DANC488 Project-Based Learning (3 Credits)
A specific project, is addressed, in dance from the perspectives of the investigator, the creator/choreographer, and the performer. Projects are cross-disciplinary and/or cross-cultural, and may involve both on- and off-campus experiences.
Restriction: Permission of ARHU-Dance department.
Repeatable to: 6 credits if content differs.

DANC489 Special Topics in Dance (1-3 Credits)
Theoretical, choreographic, pedagogic, or performance study.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits if content differs.

DANC499 Practicum in Choreography, Production and Performance IV (1-6 Credits)
Advanced workshop in dance presentation, including performing, production and planned field experiences.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC600 Graduate Dance Research (3 Credits)
Supervised writing of reports and articles on selected dance subjects. Study of library resources and interviewing techniques. Preparation for written documentation of thesis project.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC604 Graduate Studies in Dance Pedagogy (2 Credits)
Curriculum writing, lesson planning, class structure, assessment/grading, and practice in dance pedagogy. Includes preparation of syllabi and studio teaching practice. This course counts towards teaching ceritification in the State of Maryland.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC608 Graduate Choreography I (3-6 Credits)
Developing and defining individual choreographic voice and vision in a shared studio setting.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits if content differs.

DANC610 Workshop in the Direction of Dance Production (3 Credits)
A lecture/laboratory course dealing with the relationship of the director to all of the activities involved in the presentation of a dance concert.
Prerequisite: DANC410; or students who have taken courses with comparable content may contact the department.

DANC611 Dance Technology and Media (3 Credits)
Project-based development of media and technological support for dance performance, archiving, and portfolio design, development and implementation.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC647 Dance and Movement Practice (2 Credits)
Experiential studio work that generates common movement vocabulary and innovations of same in a shared, faculty-led exploration of movement for the purpose of generating vocabulary for technique, choreography, and pedagogy.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC648 Advanced Modern Dance Technique I (2 Credits)
Professional level training in contemporary dance techniques.
Prerequisite: DANC449; or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits.

DANC649 Advanced Modern Dance Technique II (2 Credits)
A continuation of DANC 648.
Prerequisite: DANC648; or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits.

DANC678 Individual Movement Practice (2 Credits)
Students in consultation with the adviser, propose a specific movement practice and can select the practice from the range of technique offerings in the program. Additional work in documenting and providing evidence of growth towards individual outcomes is required.
Prerequisite: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 10 credits.

DANC679 Graduate Dance Performance (1-3 Credits)
An advanced performance course focusing on the restagings from noted scores of the choreographic works of significant artists in the field.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC689 Special Topics in Dance (1-6 Credits)
Special Topics in dance theory, research or creative projects.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 12 credits if content differs.

DANC698 Independent Study in Dance (1-3 Credits)
Directed independent study in theoretical topics.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC705 Arts Education (3 Credits)
History of arts education in the U.S., recent policy changes and trends, current and recent research findings, proposed legislation at the state and federal level and the relationship of research designed to, in part, prepare students to be K-12 arts education and/or researchers and/or policy professionals.

DANC708 Choreography and Collaboration (3-6 Credits)
Collaborative work across disciplines and genres.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC719 Graduate Choreography Projects (3 Credits)
Research-based choreographic projects in preparation for the choreographed thesis project.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC766 Graduate Movement Observation and Analysis (2 Credits)
Aspects of cultural and nonverbal analysis, developmental movement, kinesiological analysis, Laban Movement Analysis, with the goal of developing the student/teacher's ability to observe macro and micro levels of detail.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC777 Internship in Dance (6 Credits)
Internship in dance advocacy, administration, education, community building, choreography, or performance with an agency off campus and with a national or international profile.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC779 Master's Tutorial for Performance (1-3 Credits)
Supervised performance experience for advanced dancers.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC784 Dance in a Global Context (3 Credits)
Topics that illuminate dance in global context and provides an overview of methods, challenges and perspectives to the study of dance cross-culturally will be considered. Simultaneously, surveys select dance practices spanning many geographical areas, and offers insight into the diverse social, cultural, religious, and political environments from which dance extends.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC788 Master's Tutorial for Choreography (1-3 Credits)
Supervised production and presentation of a significant choreographic project.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC789 Directed Study in Dance Theory (2-6 Credits)
Advanced directed study in dance history, theory or criticism culminating in a paper for presentation or publication.
Repeatable to: 6 credits if content differs.

DANC799 Master's Thesis Project (1-6 Credits)

ECON - Economics

ECON401 Current Issues in American Economic Policy (3 Credits)
Analysis of current economic problems and public policies. Topics could include poverty, income inequality, social insurance, education, environmental sustainability, immigration, and innovation. Other issues may be substituted depending on current events.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON424, ECON422).
Restriction: Must be in Economics Bachelor of Arts program.

ECON402 Macroeconomic Models and Forecasting (3 Credits)
Analysis of the fluctuations in economic activity and the formulation and use of forecasting models of the economy. Illustrations of computer macro models and forecasting problems.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON406 Advanced Microeconomics (3 Credits)
Expands on the assumptions of rational decision-making used in intermediate microeconomics and develops more complicated, more realistic models which address uncertainty, intertemporal choices, strategic interactions, social preferences and considerations of what is fair.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON407 Advanced Macroeconomics (3 Credits)
An in-depth analysis of current issues in macroeconomic theory and policy. Topics covered include: 1. alternative perspectives on macroeconomics including monetarism, new classical equilibrium models, rational expectations, and real business cycle models; 2. long term growth, the slowdown in productivity growth, and concerns about U.S. competitiveness; 3. the effectiveness of macroeconomic policy in an open economy; 4. the effects of finance on the real sector.
Prerequisite: Minimum grade of C- in ECON325; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON412 Economic History and Modern Development (3 Credits)
Analysis of major economic, political, and social change in the developed world since 1800. This includes factors contributing to increases in economic performance, changes in the form of government, technological change (including industrialization), and integration and disintegration of the global economy. Emphasis is on institutional changes in how societies organize economic and political activities.
Prerequisite: Minimum grade of C- in ECON325 and ECON326.
Restriction: Must be in Economics Bachelor of Science program.

ECON413 Information and Markets (3 Credits)
Presents advanced microeconomic theory, concentrating on how information affects exchange and market outcomes, including insurance, signaling, reputations, and incentive contracts. Studies applications to various markets and policy questions.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in a major within the BSOS-Economics department.

ECON414 Game Theory (3 Credits)
Studies the competitive and cooperative behavior that results when several parties find that their individual outcomes are jointly determined. Students will learn how to use game theory to analyze situations of potential conflict. Applications are drawn from economics, business, and political science.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321, STAT400).
Restriction: Must be in one of the following programs (Economics Bachelor of Arts; Economics Bachelor of Science).
Credit Only Granted for: CMSC474, ECON414, GVPT399A or GVPT390.

ECON415 Market Design (3 Credits)
Focuses on recent developments in the design of markets to improve economic performance and to open new economic opportunities. It is divided into three main segments -- auction design, the design of matching mechanisms, and antitrust theory and policy.
Prerequisite: Minimum grade of C- in ECON414.
Restriction: Must be in Economics Bachelor of Science program.

ECON416 Theory of Economic Development (3 Credits)
Economic theory of the developing nations; role of innovation, capital formation, resources, institutions, trade and exchange rates, and governmental policies.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.
Credit Only Granted for: ECON315 or ECON416.

ECON418 Economic Development of Selected Areas (3 Credits)
Economic and institutional characteristics of a specific geographic area are identified and discussed, and alternate strategies and policies for development are analyzed.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON306, ECON325, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.
Repeatable to: 6 credits if content differs.

ECON422 Econometrics I (3 Credits)
Emphasizes the interaction between economic problems and the assumptions employed in statistical theory. Formulation, estimation, and testing of economic models, including single variable and multiple variable regression techniques, theory of identification, and issues relating to inference.
Prerequisite: 1 course with a minimum grade of C- from (ECON325, ECON326); and 1 course with a minimum grade of C- from (STAT400, ECON321).
Restriction: Must be in Economics Bachelor of Science program.
Credit Only Granted for: ECON422, ECON424, AREC422, or AREC489F.

ECON423 Econometrics II (3 Credits)
Interaction between economic problems and specification and estimation of econometric models. Topics include issues of autocorrelation, heteroscedasticity, functional form, simultaneous equation models, qualitative choice models, and other computational methods.
Prerequisite: Minimum grade of C- in ECON422.
Restriction: Must be in Economics Bachelor of Science program.

ECON424 Applied Econometrics (3 Credits)
Provide the knowledge and skills necessary to accomplish and utilize basic applied econometric analysis utilized by many business service providers, government agencies, and nonprofits engaged in policy analysis. Topics include simple and multiple regressions using cross section, time series, and panel data, issues of heteroskedasticity, serial correlation, and multicollinearity, models with binary dependent variable, and program evaluation. Course emphasizes application of knowledge using software packages but still covers essential theoretical background.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON306, ECON325, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.
Credit Only Granted for: ECON422 or ECON424.

ECON425 Mathematical Economics (3 Credits)
Covers mathematical tools and skills utilized in upper undergraduate and master's level coursework in Economics and Public Policy. Reviews calculus and math of finance and growth. Introduces techniques of optimization, linear algebra, and differential equations and connects them to micro and macro theory and applications. Topics will also include coverage of probability theory to explore how economists model uncertainty, as well as economic applications of integration.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326).
Restriction: Must be in Economics Bachelor of Arts program.

ECON426 Economics of Cost-Benefit Analysis (3 Credits)
Study of how to use cost benefit analysis and other similar tools of applied microeconomics to conduct policy analyses. Cost-benefit analysis is an empirical method of identifying an optimal choice from a set of policy alternatives, where optimal is defined in terms of economic efficiency. Real world examples are addressed, so that students understand limitations of the methods and also interactions of economic analysis with political and administrative processes.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON306, ECON325, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON427 Experimental Economics (3 Credits)
An introduction to the methodology of experimental economics and its application to issues such as decision-making under uncertainty, auctions, and public goods. Also an introduction to behavioral economics as a relatively new area of economic research.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.
Credit Only Granted for: ECON398X or ECON427.
Formerly: ECON398X.

ECON435 Financial Markets and the Macroeconomy (3 Credits)
The different types of financial assets that exist, the markets that they trade in, and the determination of their prices and rates of return are examined. Specific topics that will be covered include the Markowitz portfolio selection model, the capital asset pricing model, the arbitrage pricing theory, the efficient markets hypothesis, the term structure of interest rates, and options. There will be almost no emphasis on issues in corporate finance.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program; and must not have completed BMGT343.
Credit Only Granted for: BMGT343 or ECON435.
Additional Information: Finance majors will not receive credit for ECON435.

ECON441 Theory of International Economics (3 Credits)
Theoretical treatment of international trade and international finance. Includes Ricardian and Heckscher-Ohlin theories of comparative advantage, analysis of tariffs and other trade barriers, international factor mobility, balance of payments adjustments, exchange rate determination, and fiscal and monetary policy in an open economy.
Prerequisite: Minimum grade of C- in ECON326 and ECON325.
Restriction: Must be in a major within the BSOS-Economics department; and must not have completed ECON340, ECON442, or ECON443.
Credit Only Granted for: ECON340, ECON441, ECON442, or ECON443.

ECON442 Globalization and Capital Markets (3 Credits)
Uses models of open-economy macroeconomics to explain the causes and consequences of international capital flows. Analysis is made of private consumption, investment, the government sector, current accounts, the labor market, and the money and foreign exchange markets in small open economies. This framework is then used to study examples of how speculative attacks on currencies, sudden reversals of capital inflows, and the effects of the lack of credibility of economic policy affect economic development.
Prerequisite: Minimum grade of C- in ECON326 and ECON325; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program; and must not have completed ECON441.
Credit Only Granted for: ECON441 or ECON442.

ECON443 International Trade and Trade Policy in the New Global Economy (3 Credits)
Examines the economics of international economic integration, including the theory of customs unions and free trade areas, the role of GATT and the WTO, changes in individual countries' foreign trade policies during the new era of globalization, the special role of multinational firms in world trade, and recent controversies about the benefits and costs of globalized trade.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program; and must not have completed ECON441.
Credit Only Granted for: ECON441 or ECON443.

ECON451 Public Choice (3 Credits)
Analysis of collective decision making, economic models of government, program budgeting, and policy implementation; emphasis on models of public choice and institutions which affect decision making.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON453 Natural Resources and Public Policy (3 Credits)
Rational use and reuse of natural resources. Theory, methodology, and policies concerned with the allocation of natural resources among alternative uses. Optimum state of conservation, market failure, safe minimum standard, and cost-benefit analysis.
Prerequisite: ECON326, ECON306, or AREC326. And BMGT230; or ECON230.
Restriction: Must be in one of the following programs (Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness; Economics Bachelor of Arts; Environmental Science & Policy-Env Economics). Also offered as: AREC453.
Credit Only Granted for: AREC453 or ECON453.

ECON454 Public Finance and Public Policy (3 Credits)
The role of the the public sector in a market economy constitutes the over-arching topic of this course. Emphasis lies on analyzing government expenditure programs and the microeconomics of tax policy.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON456 Law and Economics (3 Credits)
Relationship of the exchange process to the system of institutions and rules that society develops to carry out economic transactions. Topics covered include: Property rights; torts, negligence, and liability; contracts and exchanges; criminal control and enforcement; equity and efficiency issues .
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Prerequisite: At least one intermediate theory course and/or statistics.
Repeatable to: 15 credits if content differs.

ECON460 Industrial Organization (3 Credits)
Examines different theoretical models of firm behavior in markets with varying amounts of market power. Relates theory to specific industries and examines how market structure evolves over time.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON461 Economics of Regulation and Anti-trust (3 Credits)
Considers government intervention in economic activity of three types: antitrust policy, regulation of natural monopolies, and health safety regulation. Covers theoretical models, real-world policy applications, and empirical studies relevant to the impact of regulation.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON462 Economics of Entrepreneurship (3 Credits)
Economic theory highlights the role of entrepreneurs in fueling economic growth and accomplishing reallocation of resources in response to changes in preferences, technology, demographics, and resource. This course uses empirical evidence to examine the extent to which these predictions are valid. To more fully understand the motivations and constraints relevant to entrepreneurs, student will write a business plan as if s/he were starting a new business.
Prerequisite: Minimum grade of C- in ECON422.
Restriction: Must be in Economics Bachelor of Science program.
Credit Only Granted for: ECON398O or ECON462.
Formerly: ECON398O.

ECON463 Economics of Sports (3 Credits)
The application of theoretical and empirical economic tools to the sports industry, including competition at professional,collegiate, and international levels. Microeconomic models from labor, industrial organization and public finance will be applied to the sports industry and combined with data from sports markets, providing students with opportunities to produce and interpret economic analysis. The topic of discrimination will also be explored in the context of this particular economic activity.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Arts program.

ECON465 Health Economics (3 Credits)
Analyze markets for health care and related products by understanding the incentives and constraints for various participants, including individuals, family units, doctors, pharmaceutical companies, hospitals, and insurance providers. Analysis will combine both theoretical models and empirical tools.
Prerequisite: Minimum grade of C- in ECON406 and ECON422; or students who have completed ECON321 or STAT400 with an A- or better and are concurrently enrolled in ECON422, may seek permission to enroll in ECON465 from an ECON advisor. No exceptions will be made for the ECON406 prerequisite.
Restriction: Must be in Economics Bachelor of Science program.

ECON468 Special Topics in Applied Economics (3 Credits)
Selected topics in applied economics. Designed to meet the changing interests of students and staff.
Prerequisite: 1 course with a minimum grade of C- from (BMGT230, ECON230); and 1 course with a minimum grade of C- from (ECON305, ECON306).
Restriction: Must be in Economics Bachelor of Arts program.
Repeatable to: 15 credits if content differs.

ECON470 Labor Economics:Theory and Evidence (3 Credits)
An analytical treatment of theories of labor markets, and an examination of empirical findings, evidence and conclusions. Topics covered will include some or all of the following: labor demand; labor supply and labor market participation; theory of human capital; earnings differentials; and if time allows, market structure and the efficiency of labor markets; and unemployment.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON471 Labor Markets (3 Credits)
Central topics include the determinants of firms' demand for labor and households' decision making about whether to work, how much to work, and where to work. We will then study the equilibrium amount of labor hired in society and the wages paid to workers. The course will also include the measurement of the labor market, human capital, discrimination, incentives, and current changes in the American economic landscape. Various economic policies impacting labor markets will be analyzed.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and minimum grade of C- in ECON424.
Restriction: Must be in Economics Bachelor of Arts program.
Credit Only Granted for: ECON470 or ECON471.

ECON472 Economics of Social Safety Nets (3 Credits)
Analysis of the economic issues associated with social safety nets. Topics to be covered include the cash transfer programs for breaking the cycle of poverty, labor market policies aimed at combating unemployment, childhood interventions to improve human capital development, and the challenges faced by pension systems over the world. The approach is based on a life-cycle perspective. Evidence and experiences from developed and developing countries will covered.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and minimum grade of C- in ECON424.
Restriction: Must be in Economics Bachelor of Arts program.

ECON481 Environmental Economics (3 Credits)
An exploration of the use of economic incentives for protection of the environment and the determination of appropriate (or efficient) level of environmental quality. Also covers the choice of policy instruments for the attainment of environmental standards.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230).
Restriction: Must be in one of the following programs (Economics Bachelor of Arts; Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness; Environmental Science & Policy-Env Economics). Also offered as: AREC481.
Credit Only Granted for: ECON481 or AREC481.

ECON488 Applied Market Research Practicum (1-3 Credits)
Students gain experience applying economic knowledge and producing market research valued by businesses, non-profits, and/or government agencies. Students engage in activities similar to what an intern or entry-level employee would perform. Students work in small groups to find different kinds of data and facts, analyze and interpret this information, and use research findings to develop and present recommendations for simulated clients.
Prerequisite: 1 course with a minimum grade of B- from (BMGT230, ECON321, ECON230); and 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326).
Recommended: ECON422, ECON402, or ECON424.
Restriction: Permission of BSOS-Economics department.
Repeatable to: 6 credits if content differs.

ECON490 Urban & Regional Economics: Issues and Policies (3 Credits)
Exploration of urban and regional economics and policies, including economic forces leading to formation of city and regional networks. Conceptual and empirical analysis of policies affecting land use, housing, transportation and other aspects of sub-national economic development.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON321, BMGT230, ECON230).
Restriction: Must be in Economics Bachelor of Arts program.
Credit Only Granted for: ECON398I or ECON490.
Formerly: ECON398I.

ECON498 Special Topics in Economic Analysis (3 Credits)
Selected topics in economic analysis. Designed to meet the changing interests of students and staff.
Prerequisite: 1 course with a minimum grade of C- from (ECON321, STAT400); and 1 course with a minimum grade of C- from (ECON325, ECON326).
Restriction: Must be in Economics Bachelor of Science program.
Repeatable to: 15 credits if content differs.

ECON499 Independent Research in Economics (1-3 Credits)
Directed research under the supervision of a faculty member. Contact department for additional information.
Prerequisite: 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230, STAT400); and 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326); and minimum of 3 credits from ECON400-499 course range.
Restriction: Permission of BSOS-Economics department.
Repeatable to: 6 credits if content differs.

ECON601 Macroeconomic Analysis I (3 Credits)
Introductory technical treatment of standard Keynesian, classical and new classical macroeconomic models. Expectations formation and microeconomic foundations of consumption, investment, money demand, and labor market behavior.
Restriction: Permission of BSOS-Economics department.

ECON602 Macroeconomic Analysis II (3 Credits)
Further issues regarding macroeconomic topics. First half emphasis will be placed on dynamic macroeconomic theory as pertaining to monetary issues, policy ineffectiveness and effectiveness. The second half of the course will focus on theories of investment and growth.
Prerequisite: ECON601; or permission of BSOS-Economics department.

ECON603 Microeconomic Analysis I (3 Credits)
A detailed treatment of the theory of the consumer and of the firm, particularly emphasizing the duality approach. Topics include the household production model, imperfect competition, monopolistic and oligopolistic markets.
Restriction: Permission of BSOS-Economics department.

ECON604 Microeconomic Analysis II (3 Credits)
Analysis of markets and market equilibria; the Arrow-Debreu model of general equilibrium, the two-sector model, welfare theorems, externalities, public goods, markets with incomplete and asymmetric information.
Prerequisite: ECON603.
Restriction: Permission of BSOS-Economics department.

ECON611 Seminar in American Economic Development (3 Credits)
Selected topics in the long-term movements of the American economy. Quantitative studies of the growth of output; applications of econometric methods and economic theory to topics in American economic history.
Restriction: Permission of BSOS-Economics department.

ECON613 Origins and Development of Capitalism (3 Credits)
Institutions and technology shaping pre-capitalist economies: Archaic, Greek and Roman, Feudal, and Mercantile. Rise of the market system, national economies, and capitalism. The nature of industrial society. Imperialism.

ECON615 Development Economics I (3 Credits)
Explore both the causes and consequences in development economics from a historical and scientific approach. Presents theoretical models and applied work that test alternative hypotheses. Explore models of economic growth and institutions, with emphasis on property rights and political regimes as causal factors affecting development. Discuss empirical methods widely used in the field and important related topics including poverty, inequality, education and health.
Prerequisite: ECON603; or permission of BSOS-Economics department.

ECON616 Economic Development II (3 Credits)
Survey of a variety of models explaining how market failures may lead to poverty and underdevelopment, with an emphasis on the empirical evaluation of constraints faced by individuals in developing countries and the programs that attempt to alleviate those constraints. Topics include: agricultural and land markets, labor markets, human capital in developing countries, credit markets, and consumption smoothing and risk coping.
Prerequisite: ECON615, ECON603, and ECON604; or permission of BSOS-Economics department.

ECON623 Econometrics I (3 Credits)
Specification, estimation, hypothesis testing and prediction in the classical and generalized linear regression model. Topics include: ordinary least squares, generalized least squares, instrumental variableestimation, quantile regression, finite and large sample analysis and general testing principles including misspecification tests. The course will also provide instructions on the use of a major statistical packagesuch as Stata or TSP.
Prerequisite: Must have advanced knowledge of probability, statistics, and linear algebra.
Restriction: Permission of BSOS-Economics department.

ECON624 Econometrics II (3 Credits)
A continuation of ECON623. Topics include: Nonlinear models and nonlinear estimation methods (generalized method of moments and maximum likelihood estimation), panel data models, univariate dynamic models, multivariate dynamic models including simultaneous equation models, and non-parametric/semiparametric estimation methods. The course will also provide instructions on the use of a major statistical package such as Stata or TSP.
Prerequisite: ECON623; or permission of BSOS-Economics department.

ECON625 Computational Economics (3 Credits)
An examination of the specification, computation, estimation and interpretation of structural models that are widely used in applied microeconomics (empirical and theoretical Industrial Organization, public and urban economics, environmental economics, development, political economy (e.g., voting), health and education economics, trade) and Marketing. The focus will be on how to use these models in practice, and students will solve and estimate models in weekly problem sets, with solutions/code being discussed in class.
Prerequisite: ECON604 and ECON624.
Credit Only Granted for: ECON625 or ECON698R.
Formerly: ECON698R.

ECON626 Empirical Microeconomics (3 Credits)
To provide students with the opportunity to use empirical techniques that are particularly valuable in the analysis of microeconomic data. Topics include panel data, nonlinear optimization, limited dependent variables, truncated, censored, selected samples, the analysis of natural experiments, and quantile regressions. This course will emphasize hands-on practical experience.
Prerequisite: ECON624.
Restriction: Must be in Economics (Doctoral) program.

ECON630 Computational Methods in Macroeconomics (3 Credits)
Essential computational methods used in macroeconomics. There will be particular focus on approximating the solution to dynamic stochastic general equilibrium models. Methods for representative-agent and heterogeneous-agent models will be extensively studied. Econometric methods such as Generalized Method of Moments, Maximum Likelihood, Vector Autoregressions wil also be covered.
Prerequisite: ECON602 and ECON601.
Restriction: Must be in one of the following programs (Economics (Master's); Economics (Doctoral)) ; or permission of BSOS-Economics department.

ECON635 Experimental Economics (3 Credits)
An introduction to the methodology of laboratory and field experiments. The course concentrates on a series of experiments to show how experiments build on one another, allowing researchers with different theoretical dispositions to narrow the range of potential disagreement.
Restriction: Permission of instructor.

ECON636 Behavioral Economics (3 Credits)
An exploration of how people make decisions, questioning the concept of "perfect rationality" in the standard economic theory, providing improved models in line with the observed biases of decision makers. Focusing on decision making under risk and ambiguity, endowment effect, status quo bias, loss aversion, intertemporal choice, and selfish and pro-social preferences.
Prerequisite: ECON603 and ECON604; and permission of BSOS-Economics department.

ECON637 Decision Theory (3 Credits)
Decision making is a process in which we select a course of action among available options. This course will explore the various behavioral biases observed in decision making processes by adjusting our normative theories to capture these biases.
Prerequisite: ECON603 and ECON604.
Restriction: Must be in the Economics program; or must have completed ECON603 and ECON604 with a letter grade of B+ or better.
Credit Only Granted for: ECON698B or ECON637.
Formerly: ECON698B.

ECON641 Microeconomic Analysis (3 Credits)
Microeconomic analysis applied to public policy problems with an emphasis on practical examples and how they illustrate microeconomic theories. Policy issues such as pollution, welfare and income distribution, market design, industry regulation, price controls, tax policy and health insurance are practical examples used to illustrate the abstract principles of microeconomics.
Restriction: Must be in M.Prof.Studies: Applied Economics program; or permission of BSOS-Economics department.
Credit Only Granted for: ECON641 or ECON506.
Formerly: ECON506.

ECON642 Topics in Applied Macroeconomics (3 Credits)
Focus is on applied macroeconomic models used by federal agencies to explain and predict economic behavior. Course emphasizes macroeconomic data: NIPA accounts, GDP, construction and application of CPI, labor force data and economic indicators. Students will also study a selected set of current macroeconomic topics including models of economic growth, economic fluctuations, monetary policy, inflation and financial markets.
Restriction: Must be in M.Prof.Studies: Applied Economics program; or permission of BSOS-Economics department.

ECON643 Empirical Analysis I: Foundations of Empirical Research (3 Credits)
Fundamental aspects of data management and interpretation emphasizing sampling, descriptive statistics, index numbers and construction of aggregated variables. Students will learn probability theory, confidence intervals, hypothesis testing and regression analysis using the EXCEL spreadsheet program and STATA statistical software.
Credit Only Granted for: ECON643 or ECON521.
Formerly: ECON521.

ECON644 Empirical Analysis II: Introduction to Economic Models (3 Credits)
An introduction to econometric methods with applications to public policy analysis. Primary focus on application and interpretation of multiple regression analysis.
Prerequisite: ECON643.

ECON645 Empirical Analysis III: Econometric Modeling and Forecasting (3 Credits)
Study of empirical techniques that are particularly relevant to the analysis of microeconomic models. Emphasis is on advanced panel data methods, time series regressions, instrumental variables, limited dependent variables, and sample selection corrections.
Prerequisite: ECON644.
Credit Only Granted for: ECON645 or ECON523.
Formerly: ECON523.

ECON652 Public Economics I (3 Credits)
The characteristics and effects of government programs whose role is redistribution and social insurance are considered. Examples include cash welfare assistance, unemployment insurance, and Social Security. The focus is on U.S. programs, though other countries may be considered. Both theories of program design and empirical research on program effects will be covered. Topics in empirical methodology generally will also be stressed.
Prerequisite: ECON604 and ECON624.

ECON661 The Corporate Firm (3 Credits)
This course examines firms' strategic behavior in a variety of settings and considers theories of the firm and industrial structure. Topics may include product choice, quality, advertising, consumer search and switch costs, manufacturer-retailer relations, manufacturer-supplier relations, vertical integration, and alternative industrial structures.
Prerequisite: ECON604 and ECON603.

ECON662 Theories of Industrial Organization (3 Credits)
Classical theories of industry organization are analyzed. Topics include monopoly price discrimination, product differentiation and bundling as well as traditional oligopoly models of Cournot and Bertrand are examined. Dynamic models of oligopoly including entry deterrence and collusion are discussed in addition to games of research and development. Long-run industry structures and dynamics are also analyzed. Also investigates implications of these models for antitrust policy.
Prerequisite: ECON604 and ECON603.

ECON664 Empirical Studies in Industrial Organization (3 Credits)
Review recent empirical literature in industrial organization. Covers price discrimination, cartel and collusion, entry and market structure, information and competition, technological change and adoption, auction, and firm organization.
Prerequisite: ECON603, ECON604, and ECON624.
Credit Only Granted for: ECON664 or ECON698J.
Formerly: ECON698J.

ECON668 The Economics of Retail Systems (3 Credits)
This course is designed mainly but not exclusively for students in the third year of the economics Ph.D program and for students at a similar stage in a marketing program. Its main objective is to help the student generate their first professional research paper. In terms of interests it targets those in the area of microeconomics (advanced micro, industrial organization, or more generally applied microeconomics or micro aspects of any field). The course will be conducted as a seminar.
Repeatable to: 6 credits if content differs.

ECON670 Financial Economics (3 Credits)
The course applies microeconomic theory and applied econometric techniques to the study of financial institutions and markets for financial assets. Students will learn how economists model and estimate the value of financial assets. The economic and empirical models are of interest to public policy makers and private wealth managers. Specific topics can include financial intermediation, the regulation of financial institutions, risk management, portfolio theory, the capital asset pricing model and the efficient markets hypothesis.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON644.
Restriction: Must be in M.Prof.Studies: Applied Economics program.

ECON671 Economics of Health Care (3 Credits)
An examination of the structure, conduct and performance of the health care market, including a study of physician services, the pharmaceutical industry, the hospital market and health insurance. Extensive use of quantitative and analytic economic tools with special emphasis on regulatory response to market imperfections.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON645.
Credit Only Granted for: ECON671 or ECON565.
Formerly: ECON565.

ECON672 Program Analysis and Evaluation (3 Credits)
Students study the tools used to evaluate the effectiveness of public policies. All evaluations have weaknesses, and some have more weaknesses than others. You will learn how to distinguish high from low quality evaluations. We will discuss the basic economics and econometrics of program evaluation, focusing on the application of methods used for causal inference and cost-benefit analyses in public policy contexts. We will examine published evaluation research with the intent of showing how the research does or does not lead to clear conclusions regarding program performance.
Prerequisite: ECON641 and ECON645.

ECON673 Information, Game Theory and Market Design (3 Credits)
A study of the strategic decision-making and the theory and practice of market design. Focus is on the design of organized market and incentives created by market rules. Topics include online auction markets, government auctions procurement auctions and matching markets. The analysis includes documenting the rules of real-world markets, game theoretic analysis, empirical analysis, and experimental work.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON644.

ECON674 Economic Analysis of Law (3 Credits)
A study of the application of economics to law with a focus on game theory, strategic behavior and public policy.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON644.

ECON675 Environmental Economics (3 Credits)
A study of the nature of environmental regulation focusing on U.S. environmental policies and policy debates.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON645.

ECON676 Economic Development (3 Credits)
Analysis of economic development. The course will focus on the consequences of poverty and poor institutions for the behavior and welfare of individuals, households, firms and the aggregate economy in developing countries. Theoretical models and empirical evidence will be used to understand the intended and unintended consequences of policies designed to enhance economic development.
Prerequisite: ECON641; and ECON642; and must have completed or be concurrently enrolled in ECON644.
Restriction: Must be in M.Prof.Studies: Applied Economics program.

ECON681 Comparative Institutional Economics I (3 Credits)
Theory, empirics, and practice of economic institutions. Genesis, functions, and effects of institutions. Examinations of three major institutions, property, contract, and decentralization. Historical, cultural, political, and economic origins of institutions. Case studies from English history, comparative legal studies, China, history of world economic development, transition, and socialism. Perspectives from law and economics, contract theory, and information theory.

ECON683 International Macroeconomics and Finance (3 Credits)
Economic analysis of international macroeconomic issues and policy. Topics can include the study of exchange rates, balance of payments, international financial markets, international business cycles, contagion, and the roles played by international economic institutions.
Prerequisite: ECON641 and ECON642; and must have completed or be concurrently enrolled in ECON644.
Restriction: Must be in M.Prof.Studies: Applied Economics program.

ECON684 Applied Time Series Analysis and Forecasting (3 Credits)
This course builds on the brief introduction to time series econometrics offered in ECON 645. Students will learn the theory of stationary processes and how it applies to econometric techniques for estimation and forecasting based on time series data. The techniques will be applied in macroeconomic, financial and business applications.
Prerequisite: ECON642; and ECON645.
Restriction: Must be in M.Prof.Studies: Applied Economics program.

ECON698 Selected Topics in Economics (3 Credits)

ECON701 Advanced Macroeconomics I (3 Credits)
Recent developments in macroeconomics with an emphasis on topics and techniques useful for conducting research in macroeconomics. Topics include advanced treatment of fiscal and monetary policy issues; the role of imperfect competition; real, sectoral and nominal business cycle models.
Prerequisite: ECON602 and ECON601.

ECON702 Advanced Macroeconomics II (3 Credits)
Selected issues in monetary economics with an equal emphasis of learning the models and understanding important issues: a survey of models (cash-in-advance, money-in-the-utility-function, transaction cost, search-based models), empirical issues in monetary economics, business cycles and money, monetary policy, welfare cost of inflation, alternative media of exchange.
Prerequisite: ECON602 and ECON601.

ECON703 Advanced Microeconomics I (3 Credits)
Formal treatment of game theory and its microeconomic applications are presented, emphasizing dynamics and information. Equilibrium concepts for static and dynamic games, and games with complete and incomplete information are studied. Topics also discussed: mechanism design, efficiency, reputations, signaling, and screening.
Prerequisite: ECON604 and ECON603.

ECON704 Advanced Microeconomics II (3 Credits)
This is the second half of a two-semester sequence in Advanced Microeconomics, intended for second-year Ph.D. students. The course material varies from year-to-year, but currently it focuses on auction theory, matching theory, and the relationship between matching and auction theory. Other topics that are treated in some years include: sequential bargaining under incomplete information; and equilibrium refinements.
Prerequisite: ECON604 and ECON603.

ECON708 Advanced Topics in Applied and Theoretical Microeconomics (2 Credits)
Read, discuss, and analyze current topics in microeconomics, including public economics, environmental economics, labor economics, industrial economics, microeconomic theory, public choice and international trade. Specific topics covered will change from semester to semester depending on the students' and faculty's interests. Intended primarily for students beginning thesis research in economics.
Prerequisite: Must have completed a one-year graduate sequence in one of the microeconomic fields.
Repeatable to: 12 credits if content differs.

ECON709 Advanced Topics in Applied and Theoretical Macroeconomics (2 Credits)
Read, discuss, and analyze current topics in macroeconomics, including asset pricing models, models of economic growth, investment, and the labor market. Specific topics covered will change from semester to semester depending on the students' and faculty's interests. Intended primarily for students beginning thesis research in economics.
Prerequisite: Must have completed a one-year graduate sequence in one of the macroeconomic fields.
Repeatable to: 12 credits if content differs.

ECON721 Econometrics III (3 Credits)
Oriented towards macro-econometric methods. Topics covered will be selected from the following: Further discussion of topics covered in ECON624, nonlinear time series models, exogeneity and causality, non-stationary time series models (unit roots, co-integration, error correction models, vector autoregressive models), econometric models of volatility (ARCH and GARCH models, and Stochastic volatility models), rational expectations models, non-stationary panel data models, tests for structural change, Bayesian econometrics and methods for Bayesian computation.
Prerequisite: ECON624; or permission of BSOS-Economics department.

ECON722 Econometrics IV (3 Credits)
Oriented towards micro-econometric methods. Topics covered will be selected from the following: Further discussion of topics covered in ECON624, binary and multinomial response models, censored and truncated regression models, sample selection models, count data models, duration models program evaluation and treatment effects methods, structural econometrics, the identification problem, stratified and clustered samples, spatial/cross sectional dependence models, dynamic panel data models, weak instruments, non-parametric estimation, boot strap and Jack Knife methods, pre-test estimators.
Prerequisite: ECON624; or permission of BSOS-Economics department.

ECON741 Advanced International Economics I (3 Credits)
Exchange rate determination; exchange rate regimes; international monetary reform; policy conflict and cooperation; the LDC debt problem; pricing of international assets; balance of payments crises.
Prerequisite: ECON601; or permission of BSOS-Economics department.

ECON742 Advanced International Economics II (3 Credits)
Comparative advantage, Heckscher-Ohlin theory, specific-factors model, empirical verification, economies of scale, imperfect competition, commercial policy, factor mobility.
Prerequisite: ECON603; or permission of BSOS-Economics department.

ECON743 Topics in International Finance (3 Credits)
Puzzles in international finance; portfolio balance, current account dynamics, exchange rate behavior; capital market imperfections; balance of payments crises.
Prerequisite: ECON602; or permission of BSOS-Economics department.
Recommended: ECON741.

ECON744 Advanced Topics in International Economics (3 Credits)
This is an advanced course in the intersection of international finance, trade, and macroeconomics. The goal is to integrate topics from the three fields and to understand the links between individual/micro and aggregate/macro outcomes in real and financial markets. Topics include firm sale and pricing behavior, consumer choice and aggregate responses---trade elasticities, real exchange rate fluctuations, risk sharing, portfolio choice, asset pricing anomalies, and information frictions.
Prerequisite: ECON601 and ECON602.
Credit Only Granted for: ECON698M or ECON744.
Formerly: ECON698M.

ECON745 Advanced Topics in International Trade (3 Credits)
Designed primarily for students planning to write dissertations on a topic related to international trade. Its focus is on recent research in this field including tests of trade theories; the effects of trade on growth and knowledge diffusion; the political economy of trade policy and the theory and practice of trade agreements.
Prerequisite: ECON604 and ECON624.
Credit Only Granted for: ECON698L or ECON745.
Formerly: ECON698L.

ECON747 The Macreconomics of Imperfect Capital Markets (3 Credits)
After a brief overview of the micro-foundations of capital market imperfections, topics include limited commitment, the financial accelerator, liquidity, bubles, crises, the role of credit in monetary economics as well as international capital flows.
Prerequisite: ECON602 and ECON601; or (ECON604 and ECON603); or permission of BSOS-Economics department.
Restriction: Must be in one of the following programs (Economics (Master's); Economics (Doctoral)).
Credit Only Granted for: ECON698K or ECON747.
Formerly: ECON698K.

ECON752 Public Economics II (3 Credits)
Theoretical and empirical issues in taxation, with particular emphasis on income taxation.
Prerequisite: ECON751.

ECON754 Topics in Political Economy I (3 Credits)
Study of political determinants of macroeconomic outcomes. Time inconsistency in monetary and fiscal policy, political business cycles. Political models of redistribution, delay in reform, transition, growth, and international policymaking.
Prerequisite: ECON602 and ECON604; or permission of BSOS-Economics department.

ECON756 Empirical Political Economics (3 Credits)
An introduction to empirical political economy. Determinants of individual political behavior and the impact of political rules on economic outcomes will both be analyzed. Modern applied econometric techniques will also be covered.

ECON757 Topics in Political Economy II (3 Credits)
A continuation of ECON754 Topics in Political Economy I. Topics will include: the informational role of special interest groups; campaign finance, including welfare analysis of campaign finance reform; advanced models of the political economy of redistribution, with emphasis on inefficient redistribution, intergenerational redistribution, and "pork barrel" politics; fairness and redistributive politics; the effects of alternative electoral systems; theoretical models of parliamentary democracies, government formation and political parties; accountability of government officials; and the political economy of federalism.
Prerequisite: ECON602 and ECON604; or permission of BSOS-Economics department.
Recommended: ECON754.

ECON771 Advanced Labor Economics: Theory and Evidence (3 Credits)
Modern analytical and quantitative labor economics. Labor supply decisions of individuals and households; human capital model and distribution of income. Demand for labor; marginal productivity theory, imperfect information and screening. Interaction of labor demand and supply; unemployment; relative and absolute wages; macroeconomic aspects of the labor market.
Prerequisite: ECON603 and ECON624; or permission of BSOS-Economics department.

ECON772 Population Economics (3 Credits)
Covers the central ideas in population economics. These include theory and test of theories of mortality, fertility and immigration.
Prerequisite: ECON771; or permission of BSOS-Economics department.

ECON773 Topics in Applied Public and Labor Economics (3 Credits)
Explore topics in labor and public economics. Study the empirical evidence and the applied methodology used within labor and public economics. Discuss important topics in labor and public economics including immigration, education, discrimination, crime, and the role of family background. Provide instruction on how to perform empirical labor and public economic research by familiarizing students with available data sources, current research methodology, and practice with statistical packages such as Stata.
Prerequisite: ECON603, ECON604, and ECON623; and (ECON624 or ECON626).

ECON781 Valuing Environmental Benefits (3 Credits)
The theory and practice of valuing environmental benefits, including the health, recreation and aesthetic benefits associated with controlling air and water pollution, and the damages associated with climate change. Estimation of the benefits of energy efficiency improvements-including the benefits of fuel economy standards.
Prerequisite: ECON603; and ECON623. Or students who have taken courses with comparable content may contact the department.

ECON785 Advanced Economics of Natural Resources (3 Credits)
The use of exhaustible and renewable natural resources from normative and positive points of view. Analysis of dynamic resource problems emphasizing energy, mineral, groundwater, forestry, and fishery resources; optimal, equilibrium, and intergenerational models of resource allocation.
Prerequisite: ECON603, ECON604, and ECON624.

ECON799 Master's Thesis Research (1-6 Credits)

ECON808 Workshop on Macroeconomics, International Macroeconomics and International Finance (2 Credits)
*
Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON818 Workshop in Microeconomic Theory (2 Credits)
Current research in microeconomic theory. Topics drawn from game theory, mathematical economics, and the economics of information and will include applications of the theory to diverse areas of economics. Specific topics: bargaining, auctions, mechanism design, signaling, general equilibrium, industrial organization theory, and financial markets theory.
Repeatable to: 12 credits if content differs.

ECON825 Advanced Economic Welfare Analysis (3 Credits)
Theory of economic welfare measurement, problems of path dependence in evaluating multiple price changes, welfare measurement under risk, general equilibrium welfare measurement with multiple distortions, and applications in evaluation of agricultural and resource policies.
Prerequisite: ECON604 and ECON603; or permission of BSOS-Economics department.
Credit Only Granted for: ECON825 or AREC825.

ECON828 Workshop in Econometrics (2 Credits)
Current research in econometrics. Topics drawn from theoretical and applied econometrics. Special topics include: maximum likelihood and generalized method of moments estimation of linear and non-linear models, analysis of stationary and non-stationary time series, cross section time series estimation, spatial estimation mehtods, Bayesian methods, semi-and non-parametic methods, rational expectations models, numerical methods, and various applications.
Repeatable to: 12 credits if content differs.

ECON848 Workshop in International Trade, Institutional Economics and Political Economy (2 Credits)
*
Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON858 Workshop in Public Economics (3 Credits)

ECON868 Workshop in Industrial Organization, Microeconomic Theory and Behavioral and Experimental Economics (2 Credits)
Workshops designed to provide a structured environment for our faculty and graduate students to meet regularly to discuss and present their research ideas.
Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON878 Workshop in Development, Labor and Public Economics (2 Credits)
*
Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON888 Workshop in Comparative Institutional Economics (2 Credits)
Current research in institutional economics and closely related fields such as economic transition, economic development, economic theory, law and economics, political economics, and economic history. Topics are drawn from both theoretical analysis of institutions and empirical studies of the effects and determinants of institutions.
Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON898 Pre-Candidacy Research (1-8 Credits)

ECON899 Doctoral Dissertation Research (1-8 Credits)

EDCI - Curriculum and Instruction

EDCI420 Student Teaching Seminar in Secondary Education: Social Studies (1 Credit)
An analysis of teaching theories, strategies, and techniques in the student teaching experience.
Prerequisite: EDCI426 and EDCI427.
Corequisite: EDCI421 and EDCI422.
Restriction: Minimum cumulative GPA of 2.75.

EDCI421 Student Teaching in Secondary Schools: Social Studies/History (12 Credits)

EDCI422 Student Teaching in Secondary Schools: Social Studies/ Geography (12 Credits)

EDCI428 Field Experience in Secondary Social Studies Teaching (1 Credit)
Practical experience as an aide to a regular social studies teacher; assigned responsibilities and participation in a variety of teaching/ learning activities. Students must reserve one full day per week for internship placement.
Corequisite: EDCI427.
Restriction: Must be in Secondary Educ: Social Studies program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI430 Student Teaching Seminar in Secondary Education: World Language (1 Credit)
An analysis of teaching theory, strategies and techniques in the internship experience.
Prerequisite: EDCI410 and EDCI433.
Corequisite: EDCI431 and EDCI474.
Restriction: Must be in Secondary Educ: Foreign Languages program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI431 Teaching Internship in Secondary Schools: World Language (12 Credits)
Practical experience as a full-time intern with a fully licensed World Language teacher in a diverse school setting; assigned professional responsibilities and participates in teaching/learning experiences.
Prerequisite: EDCI410 and EDCI433.
Corequisite: EDCI430 and EDCI474.
Restriction: Minimum cumulative GPA of 2.75; and must be in Secondary Educ: Foreign Languages program. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.
Additional Information: Internship lab fee applies. See current program description for details.

EDCI438 Field Experience in Second Language Education (1 Credit)
Practical experience as an aide to a regular foreign language teacher; assigned responsibilities and participation in a variety of teaching/ learning activities.
Corequisite: EDCI330.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department; and must be in Secondary Educ: Foreign Languages program.
Repeatable to: 3 credits if content differs.

EDCI440 Internship Seminar in Secondary Education: English (1 Credit)
A review and analysis of current instructional theories, strategies and best practice in relation to the teaching internship. Meets at area high school; location provided before first meeting.
Prerequisite: EDCI447 and EDCI467.
Corequisite: EDCI441 and EDCI474.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI441 Internship in Secondary Schools: English (12 Credits)
Practical experience as a full-time intern with a fully licensed English teacher in a diverse school setting; assigned professional responsibilities and participates in teaching/learning experiences. Internship lab fee applies. See current program description for details.
Prerequisite: EDCI447 and EDCI467.
Corequisite: EDCI440 and EDCI474.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI447 Field Experience in English Teaching (1 Credit)
Practical experience as a part-time intern working with a fully licensed English teacher in a diverse school setting. Students must reserve one full day or two half days per week for the part-time internship.
Corequisite: EDCI467.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI448 Student Teaching in Secondary Schools: Theatre/English (12 Credits)
Practical experience as an aide to a regular English, speech or drama teacher; assigned responsibilities and participation in a variety of teaching/learning activities.
Prerequisite: EDCI417.
Corequisite: EDCI440.
Restriction: Must be in Secondary Educ: English Language Arts program.

EDCI450 Internship Seminar in Secondary Education: Mathematics (1 Credit)
Strategies and techniques in the internship experience. Structured work on teaching portfolio (requirement for graduation and certification). Place, day, and time to be arranged.
Prerequisite: EDCI457 and EDCI455.
Corequisite: EDCI451 and EDCI474.
Restriction: Must be in Secondary Educ: Mathematics program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI460 Student Teaching: Middle School (12 Credits)
A Middle-school student teaching experience in two content areas.
Prerequisite: EDCI413.
Corequisite: EDCI414 and EDCI425.
Restriction: Minimum cumulative GPA of 2.5; and permission of EDUC-Teaching, Learning, Policy and Leadership department; and for Middle School Education majors only.

EDCI464 Assessment for Reading (3 Credits)
Examination of reading assessment theory, materials and procedures; Topics include validity and reliability in reading assessment, formal and informal assessment, reading instruction that is informed by ongoing assessment, and the effects of assessment on students and schooling in a diverse society.
Prerequisite: EDCI362.
Restriction: Senior standing. And must be in Elementary Education program; or must be in Early Childhood Education program.

EDCI471 Internship in Secondary Schools: Science (12 Credits)
Practical experience as a full-time intern with a fully licensed science teacher in a diverse school setting; assigned professional responsibilities and participates in teaching/learning experiences. Internship lab fee applies. See current program description for details.
Prerequisite: EDCI470.
Corequisite: EDCI480 and EDCI474.
Restriction: Must be in Secondary Educ: Science program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI474 Teaching Academically, Culturally, and Linguistically Diverse Students in Secondary Education (2 Credits)
Multi-disciplinary capstone course for Secondary Education majors. Discussion of pedagogical and content issues relevant for teaching academically, culturally, and linguistically diverse students with particular emphasis on students with special educational needs and English language learners. Students develop and use curriculum-based assessments and/or lessons with these groups of students.
Corequisite: Enrolled in internship/certification area.
Restriction: Must be in one of the following programs (Secondary Educ: Science; Secondary Educ: English Language Arts; Secondary Educ: Mathematics; Secondary Educ: Foreign Languages; Secondary Educ: Social Studies; Secondary Educ: Art) ; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI481 Student Teaching: Elementary (12 Credits)

EDCI485 Student Teaching in Elementary School: Physical Education (4-8 Credits)
Fulfills elementary teaching requirements in K-12 physical education programs.
Restriction: Must be in Physical Education program.

EDCI495 Student Teaching in Secondary Schools: Physical Education (2-8 Credits)

EDCI497 The Study of Teaching (3 Credits)
Identification and examination of learner and teacher outcome variables related to teaching systems, methods, and processes. Methods of conducting classroom research.
Prerequisite: EDCI481.
Corequisite: EDCI489.

EDCI498 Special Problems in Teacher Education (1-6 Credits)
Individual study of approved problems.
Restriction: Must be in a major within EDUC-Teaching, Learning, Policy and Leadership department; or must be in Curriculum and Instruction (Doctoral) program; or must be in Curriculum and Instruction (Master's) program; or permission of EDUC-Teaching, Learning, Policy and Leadership department.
Repeatable to: 6 credits.

EDCI499 Workshops, Clinics, and Institutes (1-6 Credits)
The following types of educational enterprise may be scheduled under this course heading: workshops conducted by the College of Education (or developed cooperatively with other colleges and universities) and not otherwise covered in the present course listing; clinical experiences in pupil testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals and supervisors.
Repeatable to: 6 credits.

EDCI618 Proseminar for Teaching Internship (1-3 Credits)
Supports and complements candidates' internship experiences. Extends skills in implementing less plans (lesson planning), culturally competent teaching, classroom management, issues of professionalism, and protfolio development.
Prerequisite: Admission to a masters certification program in EDCI.
Corequisite: Participation in an arranged school placement.
Formerly: EDCI688E.

EDCI619 Developing a Professional Portfolio (1-3 Credits)
Students will examine issues of performance assessment and develop professional portfolios following the guidelines established by the National Board for Professional Teaching Standards. Drawing on the research data collected throughout their program and relying on inquiry, reflections, and analysis, they will synthesize and present the body of their teaching experience.
Repeatable to: 3 credits.
Credit Only Granted for: EDCI614 or EDCI619.

EDCI637 Internship in World Language/TESOL Education (2-6 Credits)
Practical experience as a full-time intern with a fully licensed World Language/TESOL teacher in a diverse school setting; assigned professional responsibilities and participates in teaching/learning experiences.
Prerequisite: EDCI434 and EDCI634; or permission of EDUC-Teaching, Learning, Policy and Leadership department.
Additional Information: Internship lab fee applies. See current program description for details.

EDCI694 Transformative Pedagogy and School Subjects (3 Credits)
Examines the potential of various pedagogoies to be transformative in relation to school subject matters, school identities, and school contexts.

EDCI785 Teacher Preparation, Diversity, and Social Change (3 Credits)
A critical examination of the theory and research on Teacher preparation with an emphasis on issues of race, class, gender, and sexuality and the pervasive inequalities manifest in K-12 school contexts.

EDCI788 Selected Topics in Teacher Education (1-3 Credits)
Current topics and issues in teacher education.
Repeatable to: 6 credits if content differs.

EDCI790 Epistemological Bases of Education Research (3 Credits)
A course on research theory, method, and design issues for doctoral students. Focuses on conceptual and theoretical understanding of methodology, the broad rand of both qualitative and quantitative methodologies, and underlying epistemologies as they apply to the study of schools, curriculum, teaching, and teacher education.
Prerequisite: EDCI780.

EDCI798 Special Problems in Teacher Education (1-6 Credits)
Intended for Masters, AGS, or doctoral students in education who desire to pursue a research problem.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI799 Master's Thesis Research (1-6 Credits)

EDCI822 Seminar in Secondary Education (3 Credits)

EDCI888 Apprenticeship in Education (1-8 Credits)
Apprentice practice under professional supervision. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI889 Internship in Education (3-8 Credits)
Internship experiences with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI898 Pre-Candidacy Research (1-8 Credits)

EDCI899 Doctoral Dissertation Research (1-8 Credits)

EDCP - Education Counseling and Personnel Services

EDCP411 Principles of Mental Health (3 Credits)
Mechanisms involved with personal adjustment, coping skills, and the behaviors that lead to maladjustment.
Prerequisite: 9 semester hours in the behavioral sciences; or permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP418 Special Topics in Leadership (3 Credits)
The special topics and leadership course will address a single topic related to leadership through the semester. In-depth study and analysis on the topic will be the basis for the course. Topics include gender and leadership, ethics and leadership, and culture and leadership. Leadership will serve as the foundation in the course.
Repeatable to: 6 credits if content differs.

EDCP420 Advanced Topics in Human Diversity and Advocacy (3 Credits)
This course will build upon students' knowledge of diversity in American society and will examine contemporary topics related to multiculturalism in educational and community contexts as well as strategies for advocacy in such venues. This course fulfills CORE requirements in diversity.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP462 Disability in American Society (3 Credits)
Critical examination of the history of discrimination and analysis of current policies toward people with severe physical and mental disabilities.
Restriction: Must have earned a minimum of 30 credits; and sophomore standing or higher.

EDCP489 Field Experiences in Counseling and Personnel Services (1-4 Credits)
Planned field experience in education-related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP498 Special Problems in Counseling and Personnel Services (1-3 Credits)
Available only to major students who have formal plans for individual study of approved problems.
Prerequisite: Available only to major students who have formal plans for individual study of approved problems.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP499 Workshops, Clinics, Institutes (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: workshops conducted by the Department of Counseling and Personnel Services (or developed cooperatively with other departments, colleges and universities) and not otherwise covered in the present course listing; clinical experiences in counseling and testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups.
Repeatable to: 6 credits.

EDCP605 Developmental Issues in Counseling Adults (3 Credits)
Theoretical approaches to adult development. The scope and variety of settings (industry, education, government) in which programs of adult counseling and guidance take place, and the nature of such programs.

EDCP610 Professional Orientation (3 Credits)
Survey of knowledge base and practices in counseling and personnel services specializations, professional ethics, credentialling relevant legislation, current issues.

EDCP611 Career Development Theory and Programs (3 Credits)
Research and theory related to career and educational decisions; programs of related information and other activities in career decision.

EDCP612 Multicultural Issues in Counseling and Personnel Services (3 Credits)
Socio-psychological, philosophical, clinical, and research topics related to the provision of counseling and personnel services, academic support, and career development for minority students on predominantly white college and university campuses. Implications of race and/or national origin on opportunities for personal, social, academic, and career development in educational settings.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP615 Counseling I: Appraisal (3 Credits)
Collection and interpretation of appraisal data, synthesis of data through case study procedures. Development of interview skills.
Corequisite: EDCP618.
Restriction: Must be in a major within EDUC-Counseling, Higher Education and Special Education department.

EDCP616 Counseling II: Theory and Practice (3 Credits)
Counseling theories and the practices which stem from such theories.
Corequisite: EDCP618.

EDCP617 Group Counseling (3 Credits)
A survey of theory, research and practice of group counseling and psychotherapy, with an introduction to growth groups and the laboratory approach, therapeutic factors in groups, composition of therapeutic groups, problem clients, therapeutic techniques, research methods, theories, ethics and training of group counselors and therapists.
Prerequisite: EDCP616.

EDCP618 Counseling Skills: Introduction to Practicum (1-6 Credits)
Development and utilization of counseling skills.
Corequisite: EDCP616.
Repeatable to: 2 credits.

EDCP619 Practicum in Counseling (2-6 Credits)
Sequence of supervised counseling experiences of increasing complexity. Limited to eight applicants in advance. Two hours class plus laboratory.
Prerequisite: EDCP616.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP620 Introduction to Mental Disorders (3 Credits)
Understanding diagnosis and assessment of mental, addictive, and co-occurringmental/addictive disorders, using the diagnostic criteria of the most prevalent psychiatricdisorders as specified by the American Psychiatric Association Diagnostic and Statistical Manuals.
Credit Only Granted for: EDCP789W or EDCP620.
Formerly: EDCP789W.

EDCP621 Practicum in School Counseling (3-6 Credits)
Sequence of supervised counseling experiences of increasing complexity.
Prerequisite: EDCP616.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP619D or EDCP621.
Formerly: EDCP619D.

EDCP622 Human Development in the Counseling Context (3 Credits)
An examination of the development of individuals over the lifespan. A focus on human development theories and the ways in which those theories are utilized within the counseling process to promote optimal development of individuals and families across the lifespan.
Credit Only Granted for: EDCP789X or EDCP622.
Formerly: EDCP789X.

EDCP625 Counseling the Chemically Dependent (3 Credits)
Chemical dependency and its effects on the individual's personal, social, and work functioning. Counseling procedures for persons with drug and alcohol problems.

EDCP627 Process Consultation (3 Credits)
Study of case consultation, systems consultation, mental health consultation and the professional's role in systems intervention strategies.
Prerequisite: Graduate course in group process.

EDCP630 School-Based Behavioral Interventions (3 Credits)
Behavior assessment and intervention techniques from behavioral, cognitive-behavioral, and ecological models. Planning, implementation, and evaluation of behavior change techniques.
Restriction: Permission of instructor; and must be in a major in EDUC-College of Education.

EDCP631 Serving Culturally and Linguistically Diverse Clients in the Schools (3 Credits)
Conceptual and empirical literature about racially, ethnically, culturally, and linguistically diverse clients. Examination and integration of cross-cultural literature.
Restriction: Must be in the School Psychology or Counselor Education programs.

EDCP632 Cognitive Assessment (3 Credits)
Assessment of cognitive functioning of children and adolescents in reference to school learning and behavior problems. Administering, scoring and interpreting cognitive assessment instruments commonly used in school systems.
Restriction: Must be in the School Psychology program; or permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP633 Diagnostic Appraisal of Children I (3 Credits)
Assessment of development, emotional and learning problems of children.
Prerequisite: EDCP632.

EDCP635 School Consultation I (3 Credits)
Theory and practice of consultation services in the school setting. Understanding of school culture. Introduction to problem solving model of case consultation for assessment and remediation of learning and behavior problems in the classroom. Practicum experience.
Restriction: Must be in the School Counseling program; or must be in the School Psychology program; or permission of instructor.

EDCP636 School Consultation II (3 Credits)
Didactic practicum in consultation services in the school setting. Case consultation and organizational consultation in the schools. Practicum experience.
Prerequisite: EDCP635.
Restriction: Must be in the School Psychology program; or permission of instructor.

EDCP640 School Psychology Seminar: Overview of the Specialty (1-2 Credits)
Overviews the specialty of school psychology, including history of the specialty, roles and functions of school psychologists, and current professional issues related to the specialty.
Restriction: Must be in the School Psychology program; or permission of instructor.

EDCP641 School Psychology Seminar: Professional Ethics (1-2 Credits)
Overviews ethical issues in the specialty of school psychology.
Restriction: Must be in the School Psychology program; or permission of instructor.

EDCP651 Group Counseling in Schools (3 Credits)
Issues and techniques of group counseling in schools.
Prerequisite: EDCP616; and for school counseling and school psychology students only.
Restriction: Permission of instructor.

EDCP652 Research in Counseling (3 Credits)
An exploration of basic and applied research, program evaluation, and associated measurement and evaluation skills crucial for professional school counselors.
Restriction: Must be in the School Counseling program.
Credit Only Granted for: EDCP652 or EDCP789Y.
Formerly: EDCP789Y.

EDCP662 Psychosocial and Medical Aspects of Disability (3 Credits)
Appraisal and understanding of the psychosocial and medical aspects of disability and chronic illness, including their nature, causes, functional aspects and treatment; understanding of how psychological and social factors influence the adjustment processes in disability.
Prerequisite: EDCP610; or students who have taken courses with comparable content may contact the department.

EDCP663 Rehabilitation and Treatment of Mental and Emotional Disorders (3 Credits)
Purpose and principles of rehabilitation and treatment methods of adolescents and adults with significant mental health disorders and dual diagnoses. Focus is on the individual as well as the family. The course includes information regarding etiology, assessment, treatment interventions, program planning, and program evaluation.
Prerequisite: EDCP610; or permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP665 Family and Social Support Systems (3 Credits)
Principles and methods useful for understanding the role of family support systems in counseling. Specialized skills for counseling impaired adults and their families.
Recommended: EDCP610.

EDCP668 Special Topics in Rehabilitation (1-6 Credits)

EDCP669 Professional Issues in Counseling Psychology (1 Credit)
Introduction to counseling psychology, including history and development of the field, and current professional and scientific issues. Exploration of career, research, and professional development opportunnities.
Prerequisite: Open only to Counseling Psychology majors. Also offered as: PSYC669.
Formerly: EDCP695.

EDCP680 Basic Didactic Practicum in Counseling Psychology (3 Credits)
In depth examination of counseling theories and techniques, and supervised experience in application of a range of counseling and therapy approaches.
Prerequisite: For Counseling Psychology majors only.
Formerly: PSYC776.

EDCP682 Counseling Psychology Didactic Practicum in Group Interventions (3 Credits)
In depth examination of theories and techniques of group interventions; supervised experience in group counseling.
Prerequisite: For Counseling Psychology majors only. Also offered as: PSYC682.
Formerly: EDCP718.

EDCP684 Counseling Psychology Didactic Practicum in Consultation (3 Credits)
In depth examination of theories and techniques of consultation on and off university campuses; supervised experience on conducting consultation.
Prerequisite: For Counseling Psychology majors only.
Formerly: EDCP789K.

EDCP685 Counseling Psychology Didactic Practicum in Counseling Supervision (3 Credits)
In depth examinatin of theories and techniques of counseling supervision, supervised experience in the process of supervising counselors.
Prerequisite: For Counseling Psychology majors only. Also offered as: PSYC685.
Formerly: EDCP745.

EDCP686 Counseling Psychology Didactic Practicum in Career Interventions (3 Credits)
In depth examination of theorectical approaches and issues in career interventions; supervised experience in career counseling and assessment.
Prerequisite: For Counseling Psychology majors only.
Formerly: EDCP777.

EDCP689 Seminar in Counseling Psychology (3 Credits)
Special topics in counseling psychology. Examples of topics include multicultural counseling, the counseling relationship, counseling and victimology, psychology treatment and health.
Prerequisite: For Counseling Psychology majors only.
Repeatable to: 12 credits if content differs. Also offered as: PSYC689.
Formerly: EDCP789.

EDCP690 Research in Counseling Psychology I (3 Credits)
Critical analysis of strategies, methodological, conceptual, and content trends.
Prerequisite: For Counseling Psychology majors only. Also offered as: PSYC690.
Formerly: EDCP778.

EDCP691 Research in Counseling Psychology II (3 Credits)
Critical analysis of trends and issues in counseling psychology science.
Prerequisite: For Counseling Psychology majors only. Also offered as: PSYC691.
Formerly: EDCP717.

EDCP692 Assessment in Counseling Psychology I (3 Credits)
Broad introduction to the construction of psychological tests and measures, and experience in test interpretation, with consideration of historical, legal, ethical, and cultural issues surrounding the assessment process.
Prerequisite: For Counseling Psychology majors only. Also offered as: PSYC692.
Formerly: EDCP789F.

EDCP693 Assessment in Counseling Psychology ii (3 Credits)
Supervised experience in administration, scoring, and interpreting major psychodiagnostic instruments used by counseling psychologists, as well as writing integrative assessment reports. Emphasis on hypothesis testing approach to assessment and on the counseling interview as an assessment tool.
Prerequisite: For Counseling Psychology majors only. Also offered as: PSYC693.
Formerly: EDCP789F.

EDCP694 Student Leadership Development (3 Credits)
Explores the development of leadership among college students including the study of leadership theory; a focus on how leadership is learned and developed; cultural demensions of leadership; and exposure to the current national scene in leadership associations, programs, and resources.
Credit Only Granted for: EDCP694 or EDCP789D.
Formerly: EDCP789D.

EDCP695 Ethical and Professional Issues in Counseling Psychology (3 Credits)
Exploration of ethical and professional issues in Counseling Psychology.
Prerequisite: Only open to Counseling Psychology majors. Also offered as: PSYC695.
Credit Only Granted for: EDCP669, EDCP688, EDCP695, PSYC688, or PSYC695.
Formerly: EDCP669 and EDCP688.

EDCP697 Multicultural Issues in Counseling Psychology (3 Credits)
Exploration of knowledge, attitudes and skills for providing counseling and psychological services to culturally diverse populations.
Prerequisite: Only open to Counseling Psychology majors. Also offered as: PSYC697.
Credit Only Granted for: EDCP697, EDCP699, or PSYC697.
Formerly: EDCP699.

EDCP698 advanced Didactic Practicum in Counseling Psychology (3 Credits)
In depth examination of approaches to or theories abouth intervention, and supervised experience in the application of those approaches or theories. Each practicum focuses on a particular approach, e.g., psychodynamic, cognitive-behavioral, cross-cultural.
Prerequisite: For Counseling Psychology majors only.
Repeatable to: 12 credits if content differs. Also offered as: PSYC698.
Formerly: EDCP776.

EDCP700 Theories and Strategies of Counseling Psychology (3 Credits)
Introduction to the professional field, examination of pertinent scientific and philosophical backgrounds, and survey of the major theories, principles, and training models in counseling. Correlated laboratory analogue experiences in dydactic and group interrelationships.
Prerequisite: For Counseling Psychology majors only. Also offered as: PSYC700.
Formerly: EDCP789J.

EDCP715 Appraisal Measures in Counseling (3 Credits)
Prerequisites: EDCP 615 and EDMS 646 or their equivalents.
Interpretation and utilization in counseling of the career interest and personality measures.
Prerequisite: EDCP615 and EDMS646; or students who have taken courses with comparable content may contact the department.

EDCP716 Advanced Counseling Theory Seminar (3 Credits)
Systematic investigation of methods of theory analysis and their application to counseling theory.
Prerequisite: Master's degree in counseling; or permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP717 Evaluation of Research in Counseling (3 Credits)
Research on process and outcome in counseling. A review of research and appropriate research methodologies.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP718 Advanced Seminar in Group Processes (2-6 Credits)

EDCP735 Seminar in Rehabilitation Counseling (3 Credits)
Part of the core curriculum for rehabilitation counselors. Designed to provide the advanced rehabilitation counseling student with a formal seminar to discuss, evaluate and attempt to reach personal resolution regarding pertinent professional problems and issues in the field.

EDCP738 Practicum in Child Assessment (1-6 Credits)
Administration of complete test batteries to children; supervision of initial interviews; test administration and scoring; interpretation and synthesis of test battery and interview material; the psychological report; verbal interpretation of test results; and recommendations. Taken initially with EDCP 633; repeated with EDCP 634 in the subsequent semester.
Corequisite: EDCP633 and EDCP634.
Repeatable to: 6 credits.

EDCP740 Issues and Methods in Counselor Education (3 Credits)
Competencies, current issues, and methods in the pre-service and continuing education of counselors.
Restriction: Must not be in Counseling and Personnel Services (Doctoral) program.

EDCP741 Multicultural Practice in Student Affairs: Self, Education, and Society (3 Credits)
Develop knowledge and skills in the area of multicultural practice in student affairs through the examination of oppression, power, and privilege and how these dynamics impact individuals, educational institutions, and societies.
Prerequisite: EDCP771.
Credit Only Granted for: EDCP741 or EDCP789Z.
Formerly: EDCP789Z.

EDCP742 Examining College Environments and Outcomes (3 Credits)
Explores theory and research on the impact of the college environment on undergraduate student outcomes. Discusses environmental theory and assessment, college impact theory, outcomes assessment, and implications of the above for higher education and student affairs.
Prerequisite: EDMS651; or permission of instructor.
Credit Only Granted for: EDCP742 or EDCP789K.
Formerly: EDCP789K.

EDCP745 Supervision of Counseling (3 Credits)
Survey of knowledge base, research approaches, and applied skills in supervision of counseling.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department; and must be in a major within EDUC-Counseling, Higher Education and Special Education department.

EDCP746 Clinical Supervision of Pupil Personnel Services (3 Credits)
Supervision of role of psychologists and counselors in school settings; applied skills in supervision of services.
Prerequisite: Advanced Doctoral Students Only.
Restriction: Permission of instructor.

EDCP770 Service-Learning and College Student Development (3 Credits)
Historical roots, concepts, and principles of practice of service-learning in higher education; includes community service component.
Credit Only Granted for: EDCP770 or EDCP789Y.
Formerly: EDCP789Y.

EDCP771 The College Student (3 Credits)
A demographic study of the characteristics of college students as well as a study of their aspirations, values, and purposes.

EDCP772 Research in Student Affairs (3 Credits)
Research designs and approaches to research in student development and higher education. Development of research for research competency or dissertation proposal.
Prerequisite: EDCP656; or permission of instructor.
Restriction: Must be in the College Student Personnel program.

EDCP774 Advanced Seminar in Theories of College Student Development (3 Credits)
An opportunity for in-depth study, dialogue, and reflection about theoretical frameworks for understanding the development of college students. Specific attention is given to enhancing knowledge and understanding of the development of students when social identities and their intersections are considered.
Prerequisite: EDCP771; or students who have taken courses with comparable content may contact the department.

EDCP775 Facilitating Student Learning in Higher Education (3 Credits)
Application of selected models of college student development, learning styles, and related models of instruction to the assessment of characteristics and the design of learning environments.
Prerequisite: EDCP771; or permission of EDUC-Counseling, Higher Education and Special Education department.
Restriction: Must be in Counseling and Personnel Services (Doctoral) program.

EDCP776 Social Justice in Student Affairs and Higher Education (3 Credits)
An exploration of differences, biases, assumptions, limitations, and challenge with diversity in the context of higher education and student affairs. Focusing on issues of inequities with social identity group membership and the systems of power, privilege, and oppression in society.
Prerequisite: EDCP771 or EDCP741; or permission of instructor.
Restriction: Limited to college student personnel students only.

EDCP778 Research Proposal Seminar (3 Credits)
The development of thesis, dissertation or other research proposals.

EDCP788 Advanced Practicum (1-6 Credits)
Individual supervision in one of the following areas: (a) individual counseling, (b) group counseling, (c) consultation, or (d) administration.
Prerequisite: Previous practicum experience.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP789 Advanced Topics in Counseling and Personnel Services (1-6 Credits)

EDCP797 Capstone Course: Program Planning (3-6 Credits)

EDCP798 Special Problems in Counseling and Personnel Services (1-6 Credits)
Master's AGS, or doctoral candidates who desire to pursue special research problems under the direction of their advisers may register for credit under this number.
Prerequisite: Master's AGS, or doctoral candidates who desire to pursue special research problems under the direction of their advisers may register for credit under this number.

EDCP799 Master's Thesis Research (1-6 Credits)
Registration required to the extent of six hours for Master's thesis.

EDCP870 Professional Issues Seminar (3 Credits)
Examination of issues that bear on professional issues such as ethics, inter-professional relationships and research.
Credit Only Granted for: EDCP656 or EDCP870.
Formerly: EDCP656.

EDCP871 Student Affairs Doctoral Capstone Seminar (3 Credits)
Broadening perspectives on issues in student affairs and higher education by exploring the multiple roles and responsibilities of campus administrators and faculty members.
Prerequisite: EDCP870; or permission of instructor.
Restriction: Must be in the College Student Personnel program.
Credit Only Granted for: EDCP789I or EDCP871.
Formerly: EDCP789I.

EDCP879 Internship in School Counseling (4-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Repeatable to: 9 credits.
Credit Only Granted for: EDCP888G or EDCP879.
Formerly: EDCP888G.

EDCP888 Apprenticeship in Counseling and Personnel Services (1-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP889 Internship in Counseling and Personnel Services (1-8 Credits)
Internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Prerequisite: Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Repeatable to: 8 credits if content differs.

EDCP898 Pre-Candidacy Research (1-8 Credits)

EDCP899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 12-18 hours for a Ph.D. Dissertation.

EDHD - Education, Human Development

EDHD400 Introduction to Gerontology (3 Credits)
Multidisciplinary survey of the processes of aging. Physiological changes, cultural forces, and self-processes that bear on quality of life in later years. Field study of programs, institutions for elderly, individual elders, their families and care providers.

EDHD401 Promoting Optimal Aging (3 Credits)
Theoretical, research, and applied issues related to optimal aging from psychological, biological, and societal perspectives. Group or individual projects involving direct field experiences.
Prerequisite: EDHD320; or EDHD400; or permission of EDUC-Human Development and Quantitative Methodology department.
Credit Only Granted for: EDHD401 or EDHD641.

EDHD402 Social Development (3 Credits)
Social Development. Critical concepts and ideas of the study of child and adolescent social development. Focus on changes in interpersonal relationships, emotions, achievement-related behavior and competence, and functioning within the broader social context.
Recommended: EDHD411.

EDHD411 Child Growth and Development (3 Credits)
Theoretical approaches to and empirical studies of physical, psychological and social development from conception to puberty. Implications for home, school and community.

EDHD412 Infant Development (3 Credits)
Infant development across domains, including perceptual, motor, cognitive, language, social and emotional functioning from pre-natal through third year of life.

EDHD413 Adolescent Development (3 Credits)
Adolescent development, including special problems encountered in contemporary culture. Observational component and individual case study.

EDHD414 Development of the Scientific Mind Across the Lifespan (3 Credits)
Study of the educational, cognitive, social, and cultural factors that underlie the development of the scientific mind across the lifespan.
Recommended: EDHD320.

EDHD415 Promoting the Social-Emotional Competence of Young Children in Inclusive Classrooms (3 Credits)
Teachers must have knowledge and skill regarding how to appropriately manage the classroom so that all children, those with and without disabilities, will be able to learn from their school experiences. Classroom management extends beyond responding to student misbehavior to include a comprehensive approach to addressing the social/emotional competence of typically and atypically developing children. The goal of this course is to prepare early childhood teachers who are able to sensitively, responsively, and effectively manage a classroom of young students who are typically developing and those who have disabilities. Includes Field Experience.
Prerequisite: EDHD314 and EDHD425; and (EDHD419 or EDSP420).
Corequisite: EDSP423, EDSP424, and EDHD431.
Restriction: Must be in the Professional Early Childhood/Early Childhood Special Education program; and junior standing or higher; and minimum cumulative GPA of 2.75.

EDHD420 Cognitive Development and Learning (3 Credits)
Current developmental theories of cognitive processes such as language, memory, and intelligence and how differences in cognitive level (infancy through adolescence) mediate learning of educational subject matters.
Prerequisite: EDHD320, EDHD411, PSYC341, or PSYC355; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD421 Peer Relations (3 Credits)
Historical and theoretical underpinnings to contemporary research on peer interactions, relationships, and groups. Focus on (1) inter-dependencies of individual characteristics, social behaviors, social relationships; (2) relations between familial factors and extra-familial peer interactions and relationships; (3) normal and abnormal peer relationships; and (4) cross cultural universals and differences.
Recommended: EDHD411.

EDHD424 Culture, School & Community: Contexts for Learning (PreK-3rd) (3 Credits)
Explores the development of the young child (with and without disabilities, as well as those at environmental risk) in the context of the family and community, with emphasis on the impact of state, federal and school system policy on the child's world. Course will consider issues within the family, and the wider socio-cultural ecology that relate to the child's ability to develop and learn. In addition, students will develop strategies for respectful and culturally responses approaches to actively engage families in their children's development and learning. Includes Field Experience.
Prerequisite: EDHD425 and EDHD314; and (EDHD419 or EDSP420).
Corequisite: EDSP315, EDHD431, EDHD415, and EDSP423.
Restriction: Must be in the Professional Early Childhood/Early Childhood Special Education program; and junior standing or higher; and minimum cumulative GPA of 2.75.

EDHD425 Language Development and Reading Acquisition (3 Credits)
This course focuses on young children's language development and the relationship between language and reading acquisition. Students will learn: concepts central to language development; language achievements at different ages; concepts of emergent literacy; models of reading acquisition and skilled reading.

EDHD426 Cognitive and Motivational Literacy Content (3 Credits)
Students preparing for secondary teaching will learn about the cognitive and motivational aspects of literacy and learning from text for the content areas of literature, science, history and mathematics. Different evidenced-based literacy approaches appropriate for content learning are presented. Characteristics of learning environments that enable students to engage productively with diverse texts, disciplinary tasks, and technological resources in content areas are identified.

EDHD427 Constructing and Integrating the Early Childhood Curriculum (3 Credits)
Explores the world from the child's perspective and constructs curriculum based on cognition, learning, and children's experiences. The integrated curriculum is the overarching framework for this course. Includes field experience.
Prerequisite: EDHD314, EDHD313, EDHD424, and EDSP470.
Corequisite: EDHD323, EDHD322, EDHD315, EDHD321, and EDHD435.
Restriction: Must be in Early Childhood Education program; and senior standing.

EDHD430 Adolescent Violence (3 Credits)
Examines the roots of violence among adolescents and the extent to which this constitutes a problem in various settings. Research studies on its origins, prevention and intervention and implications for social policy are examined.
Prerequisite: PSYC100; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD431 Child Development and Learning, Three to Eight Years (3 Credits)
Provides a basic understanding of child development theory and research, as well as specific knowledge about the development of children during the early and middle childhood "stages," specifically from ages 3 years to 8 years. A major emphasis will be the application of theory and research from the field of educational psychology to an understanding of how young children learn and achieve academically. Because the course will address the developmental and academic functioning of children with and without disabilities, a particular focus will be on individualization.
Prerequisite: Minimum grade of C- in EDHD314 and EDHD425; and 1 course with a minimum grade of C- from (EDHD419, EDSP420).
Corequisite: EDSP423 and EDSP315; and TRACK I: Must be concurrently enrolled in EDSP430, EDSP433; or TRACK 2: Must be concurrently enrolled in EDHD415, EDHD424.

EDHD432 Internship in EC/ECSE (12 Credits)
Interns spend five days per week in the classroom/home-based setting (under the mentorship of a certified teacher) where they gradually assume full responsibility for the planning, delivery and assessment of instruction or an intervention. Track I students will have an Infant/Toddler placement with special educator, Track II students will be in a Pre-K/K or Grade 1,2,3 classroom with general or special educator (must be opposite grade level and mentor from Phase I/fall of the senior year).
Prerequisite: EDHD323, EDHD322, EDSP417, EDHD441, EDHD442, EDHD443, EDHD444, and EDSP321.
Corequisite: EDHD437.
Restriction: Must be in Early Childhood and Early Childhood Special Education program; and senior standing or higher.

EDHD434 Child Development, Birth to Three Years (3 Credits)
Designed to provide students with an understanding of child development theory and research, as well as knowledge about typical and atypical development of children from birth to three years of age. The course emphasizes learning for children with and without disabilities, and for children who are at risk due to poverty and other environmental factors. The course will introduce how children develop and the challenges they face within the domains of physical, cognitive, language, social, and emotional development, with particular attention paid to the impact of risk factors on development. Students will become familiar with delays and differences in development that may occur as the result of disability. Finally, students will learn the effects of cultural and linguistic differences on growth and development. Information about theory and research in child development for children with and without disabilities will be enhanced through a series of observational experiences, which will build upon concepts addressed during class. Includes field experiences.
Prerequisite: EDHD210, EDHD220, and EDSP211.
Corequisite: EDHD314 and EDHD425. Also offered as: EDSP420.
Credit Only Granted for: EDHD419A, EDSP420 or EDHD434.
Formerly: EDHD419A.

EDHD435 Effective Components of the Early Childhood Classroom (3 Credits)
Explores three topics integral to effective, child-centered early childhood classrooms: assessment, classroom management and parent involvement. Includes field experience.
Prerequisite: EDHD419, EDHD314, EDHD313, EDHD424, and EDSP470.
Corequisite: EDHD323, EDHD322, EDHD315, EDHD321, and EDHD427.
Restriction: Must be in Early Childhood Education program; and senior standing or higher.

EDHD436 Cognition and Motivation in Content Area Literacy for Middle-School Students (3 Credits)
Cognitive and motivational processes of literacy and learning from texts across subjects. Structured approaches to using reading, writing, and speaking for content learning based on approaches to knowledge, motivation, and strategies. Classroom contexts that enable middle-school students to engage with diverse texts and Internet resources are provided

EDHD437 EC/ECSE Teachers as Researchers and Reflective Practitioners (3 Credits)
Students use action research to improve instructional delivery or familial interactions in an effort to enhance the overall educational experiences/outcomes of children in classrooms or home-based contexts. Students will design and implement an action research project in an effort to meet a goal articulated in an applicable Individualized Education Plan (IEP) or Individualized Family Service Plan (IFSP) or School Improvement Plan (SIP) as the basis of their project.
Prerequisite: Minimum grade of C- in EDHD322, EDHD323, EDSP321, EDSP417, EDHD441, EDHD442, EDHD443, and EDHD444.
Corequisite: EDHD432.

EDHD440 Adult Development (3 Credits)
Major conceptual approaches to the study of adult development including physical, cognitive, social, emotional and self processes that take place within individuals as they progress from emerging adulthood through middle age.
Prerequisite: EDHD320; or permission of EDUC-Human Development and Quantitative Methodology department.
Recommended: EDHD413.

EDHD441 Data Driven Decision Making in EC/ECSE (1 Credit)
Students will be exposed to formative (e.g., classroom based, ongoing) and summative (e.g., standardized testing) assessments. Students will collect and analyze formative assessment data from their internship classrooms as the bases of planning and delivering instruction to meet the diverse needs of all learners. They will also analyze standardized assessment data to gain an understanding of measures used to determined cross-school and cross-teacher effectiveness. Includes Phase I field experience.
Prerequisite: Minimum grade of C- in EDSP423, EDHD431, and EDSP315; and TRACK I: Must have completed EDSP430 and EDSP433 or TRACK 2: Must have completed EDHD415 and EDHD424.
Corequisite: EDHD322, EDHD323, EDSP321, EDSP417, EDHD442, EDHD443, and EDHD444.

EDHD442 Interventions for Children with Behavioral Challenges (1 Credit)
Students will expand knowledge of and develop skills to address challenging behaviors in inclusive early childhood classrooms. Students examine the causes underlying challenging behaviors during the early childhood years, and identify appropriate resources and support services for working with families to develop a unified approach when responding to behavioral challenges. Includes Phase I field experience.
Prerequisite: Minimum grade of C- in EDSP423, EDHD431, and EDSP315; and TRACK I: Must have completed EDSP430 and EDSP 433; or TRACK 2: Must have completed EDHD415 and EDHD 424.
Corequisite: EDSP321, EDSP417, EDHD322, EDHD323, EDHD441, EDHD443, and EDHD444.

EDHD443 Interventions for Children with Social and Communication Challenges (1 Credit)
Students will learn about the characteristics of children with autism spectrum disorder, pervasive developmental disorder, social communication disorder, and other related challenges and will be equipped to meet the needs of this group of children in the early childhood classroom. The utilization of Universal Design for Learning (UDL), Response to Intervention (RTI) and other early childhood special education approaches, as they apply to this specific group of children, will be addressed. Interventions designed to improve the functioning of children with autism spectrum disorders and related disorders will be reviewed. Includes Phase I field experience.
Prerequisite: Minimum grade of C- in EDSP423, EDHD431, and EDSP315; and TRACK I: Must have completed EDSP430 and EDSP 433; or TRACK 2: Must have completed EDHD415 and EDHD 424.
Corequisite: EDHD322, EDSP321, EDSP417, EDHD323, EDHD441, EDHD442, and EDHD444.

EDHD444 Action Research in EC/ECSE (1 Credit)
Students will become familiar with the EC/ECSE research process, literature and how teachers use action research to improve pedagogy and the experiences of children in classrooms or home-based contexts. Students will utilize this knowledge, as well as either a goal in an Individualized Education Plan (IEP) or Individualized Family Service Plan (IFSP) or School Improvement Plan (SIP), to develop an action research study commenced during the following semester. Includes Phase I field experience.
Prerequisite: Minimum grade of C- in EDSP423, EDHD431, and EDSP315; and track 1: Must have completed EDSP430 and EDSP433; OR Track 2: Must have completed EDHD415 and EDHD424.
Corequisite: EDHD322, EDHD323, EDHD441, EDHD442, EDHD443, EDSP417, and EDSP321.

EDHD445 Guidance of Young Children (3 Credits)
Practical aspects for helping and working with children, drawing on research, clinical studies, and observation. Implications for day care and other public issues.
Prerequisite: PSYC100; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD460 Educational Psychology (3 Credits)
Application of psychology to learning processes and theories. Individual differences, measurement, motivation, emotions, intelligence, attitudes, problem solving, thinking and communicating in educational settings.
Prerequisite: PSYC100; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD489 Field Experiences in Education (1-4 Credits)
Planned field experience in education-related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 4 credits.

EDHD498 Special Problems in Education (1-3 Credits)
Available only to students who have definite plans for individual study of approved problems.
Prerequisite: Available only to students who have definite plans for individual study of approved problems.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD499 Workshops, Clinics, and Institutes (1-6 Credits)
The following types of educational enterprise may be scheduled under this course heading: workshops conducted by the College of Education (or developed cooperatively with other colleges and universities) and not otherwise covered in the present course listing; clinical experiences in pupil-testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals and supervisors.
Repeatable to: 6 credits.

EDHD600 Introduction to Human Development and Child Study (3 Credits)
An overview of the multidisciplinary, scientific principles which describe human development and behavior and an application of these principles in an analysis of a behavioral record. Techniques of observation, recording, and analysis of human behavior. Emphasis on critiquing and applying research findings.

EDHD601 Biological Bases of Behavior (3 Credits)
Emphasizes that understanding of human life, growth and behavior depends on understanding physical processes. Application throughout is made to brain-behavior relationships and implications for understanding and working with people.
Prerequisite: Must have completed or be concurrently enrolled in EDHD600; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD602 Social Bases of Behavior (3 Credits)
The social forces and expectations that influence behavior from infancy through old age and death. The effects of ethnicity, social learning values, attitudes, historical events and mass media on perception and behavior in societal interactions.

EDHD605 Curriculum in Early Childhood Education (3 Credits)
Curriculum theory, research and practice in educational settings for infants and children to age eight.

EDHD611 Cultural and Contextual Influences on the Young Child (3 Credits)
Theory and research on social and cultural influences in early child development.

EDHD612 Teaching Strategies in Early Childhood (3 Credits)
Theory and research of teacher-student interaction. Analysis of planning, organization of learning environments, evaluation of learning, and interpersonal relationships.
Restriction: Must not have completed EDCI612.
Credit Only Granted for: EDHD612 or EDCI612.
Formerly: EDCI612.

EDHD616 Teacher-Parent Relationships (3 Credits)
Research in parental involvement in school activities and processes.
Credit Only Granted for: EDHD616 or EDCI613.
Formerly: EDCI613.

EDHD617 Achievement Motivation in Adolescence (3 Credits)
Study of different aspects of motivation and how they develop in the secondary school years. Focus on how different instructional practices influence motivation and design of various strategies for improving students motivation.
Credit Only Granted for: EDHD779W or EDHD617.
Formerly: EDHD779W.

EDHD619 Advanced Scientific Concepts in Human Development (3 Credits)
A critical examination of concepts and issues in contemporary culture as these relate to the development and learning of children and youth.
Repeatable to: 6 credits if content differs.

EDHD624 Cognitive and Motivational Bases of Literacy Instruction in the Content Areas (6 Credits)
Secondary and middle school teachers learn about and apply knowledge and skills related to the cognitive and motivational dimensions of literacy and learning from text for a variety of content areas. Characteristics of learning environments that enable students to engage productively with diverse texts, disciplinary tasks, and technological resources in content areas are identified.
Credit Only Granted for: EDHD624 or EDHD779G.
Formerly: EDHD779G.

EDHD629 Seminar for the Center for Children, Relationships, and Culture (1 Credit)
A seminar and colloquia series featuring speakers from the department, the college, the university, and other universities and institutions from across the world that aims to cover issues pertaining to contemporary theory and research in human development.
Recommended: For graduate students in Human Development.
Repeatable to: 8 credits if content differs.

EDHD635 Adolescents at Risk (3 Credits)
Study of current research on risky behaviors that impact adolescent student learning and achievement particular in underserved populations. General diversity issues and topics specific issues that put adolescents at risk for academic failure and other negative trajectories will be explored.
Recommended: EDHD600.
Credit Only Granted for: EDHD635 or EDHD779L.
Formerly: EDHD779L.

EDHD659 Direct Study of Individuals (3 Credits)
Observational techniques to record the behavior of an individual. Procedures to ensure objectivity in data collection. Methods used to analyze, categorize, quantify observational data in research.

EDHD662 Research Methods in Education Settings (3 Credits)
Research methods associated with studying the development, achievement, and school adjustment of children and adolescents in educational settings, with an emphasis on quantitative methodologies.

EDHD674 Self Processes in Adolescence: Implications for Academic Achievement and School Adjustment (3 Credits)
Study of the development of the self from infancy through adolescence, and examination of the literature on the self processes of special adolescent populations as they relate to achievement-related orientations and school adjustment in secondary settings.
Credit Only Granted for: EDHD619L or EDHD674.
Formerly: EDHD619L.

EDHD690 Theoretical Foundations of Human Development (3 Credits)
Theoretical foundations in the field of human development with a focus on connections between the major theoretical paradigms in the literature and current research in developmental science.

EDHD692 Cognitive Basis of Instruction (3 Credits)
Psychological and educational research literature on human cognition, especially as applied to learning and teaching in classroom settings.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD700 Infant Development (3 Credits)
An examination of recent research findings in physical, social, emotional and language development during infancy. A review of prenatal and perinatal factors in relation to their influence on later development.

EDHD711 Peer-Culture and Group Processes in Human Development (3 Credits)
The process of group formation, role-taking and status-winning, and the emergence of the peer-culture during childhood and the evolution of the child society at different maturity levels to adulthood. The developmental tasks and adjustment problems associated with winning, belonging, and playing roles in the peer group.
Prerequisite: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD712 Education and Group Care (3 Credits)
The historical, theoretical and empirical basis for the group care and education of young children with special emphasis on the child under the age of three.
Prerequisite: EDMS645; or permission of EDUC-Human Development and Quantitative Methodology department.
Credit Only Granted for: EDHD711 or EDCI712.
Formerly: EDCI711.

EDHD713 Research in Early Childhood Education (3 Credits)
The design and conduct of research with infants and children to age eight; reviews, evaluations and discussions of significant and relevant early childhood research literature.
Prerequisite: EDMS645; or permission of EDUC-Human Development and Quantitative Methodology department.
Credit Only Granted for: EDHD713 or EDCI713.
Formerly: EDCI713.

EDHD718 Apprenticeship in College Teaching (1 Credit)
For graduate students teaching autonomously for the first, second, or third tiem at the University of Maryland, College Park; not intended for teaching assistants. This course provides graduate student teachers with a set of structured experiences that foster professional growth and development in the role of college instructor. Includes seminars on the scholarship of college teaching and principles of optimal college classroom environments, peer and faculty in-class observations of teaching, and guided reflective analysis of experience in the classroom.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD720 Social Development and Socialization Processes (3 Credits)
This course covers social development and socialization processes across the life-span. The course typically covers the following topics: parent-child relationships, peer relationships, moral development, social cognition, social competence, social motivation, self-regulation, and cultural influences on development. This is core doctoral course.

EDHD721 Cognitive Development and Learning: An Introduction (3 Credits)
Introductory survey into contemporary theory and research in cognitive development; applications to classroom learning.

EDHD722 Learning Theory and the Educative Process (3 Credits)
Advanced study of theories, issues and research in several categories of cognition and learning applied to education and the helping professions.
Prerequisite: EDHD721; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD750 Culture, Context, and Development (3 Credits)
This course will cover theory and research on cultural and contextual influences on social development.

EDHD751 Child Development and Poverty (3 Credits)
This course examines the theoretical, methodological, and empirical literature on the effects of poverty on children's development from a multidisciplinary perspective. It includes basic concepts in methodology, measurement design, and issues related to connecting basic research on poverty and children to policy and program interventions.
Prerequisite: EDHD720; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD760 Advanced Educational Psychology (3 Credits)
Appplication of psychology to learning processes and theories. Individual differences, measurement, motivation, and intelligence.
Prerequisite: Prior course in educational psychology, learning, or cognition; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD768 Laboratory Methods in Developmental Psychophysiology (3 Credits)
Covers basic electrophysiology and human electrophysiology. Topics include recording, processing, and analyzing EEG and ERP. Emphasis will be placed on the testing of infant and child populations.
Recommended: EDHD775.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

EDHD775 Human Development and Neuroscience (3 Credits)
Course focuses on the biological bases of human behavior including physiological processes which have an impact on human development.
Prerequisite: EDHD601; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD779 Selected Topics in Human Development (1-6 Credits)
This course focuses on topics of current significance in human development research. Topics covered change each semester, and vary by instructor.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 6 credits if content differs.

EDHD780 Research Methods in Human Development (3 Credits)
Research methodology for studying human development: research design, hypothesis formulation, instrument development, methodological and statistical approaches, survey of methodologies.
Prerequisite: EDMS651; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD789 Internship in Human Development (3-8 Credits)
Internship experience in one or more human service agencies in the community.
Prerequisite: 9 credits in EDHD courses.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 9 credits.

EDHD798 Laboratory in Human Development (1-6 Credits)
Independent research supervised by an instructor in a research setting.
Repeatable to: 9 credits if content differs.

EDHD799 Master's Thesis Research (1-6 Credits)
Registration required to the extent of six hours for master's thesis.

EDHD800 Seminar in Early Childhood Education (3 Credits)
This seminar explores relevant current issues in early childhood development and education.

EDHD820 Advanced Topics in Social Development (3 Credits)
Advanced doctoral seminar on socialization and social development with consideration of selected topics. Identification of research problems and areas of application.
Prerequisite: EDHD720; or permission of EDUC-Human Development and Quantitative Methodology department.
Credit Only Granted for: EDHD820 or EDHD821.
Formerly: EDHD821.

EDHD830 Self Processes in Human Development I (3 Credits)
Doctoral core course focused on personality theories -- their history, constructs, and methods; examination of the reciprocal relation between self and the social environment; consideration of different conceptualization of self-processes and related personality research.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD835 The Development of Achievement Motivation (3 Credits)
Development of achievement motivation and how it relates to academic achievement during the elementary and secondary school years. Expectancy-value theory, attribution theory, self-efficacy theory, socialization of achievement motivation.
Prerequisite: EDHD830 or EDHD721; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD840 Language and Literacy Development (3 Credits)
Content of this course is current theoretical and empirical research on children's language developments and on the linguistic basis of beginning reading.

EDHD842 Learning in Context (3 Credits)
Educational and home context that influence development of motivation, cognitive strategies, and knowledge will be explored.
Prerequisite: EDHD721.

EDHD850 Social Cognition and Moral Reasoning (3 Credits)
Theory and research on social-cognition development and moral development, from infancy to adolescence will be covered.

EDHD870 The Role of Research in Current Federal Initiatives in Early Childhood Education and Development (3 Credits)
This course focuses on the ways in which child development and early education research supports and directs federal initiatives regarding early childhood.

EDHD872 Young Children at Environmental Risk: Developmental and Intervention Issues (3 Credits)
Examination of impact of poverty on young children, their families, and communities. Epidemiological, physiological, and sociological studies will be reviewed.

EDHD875 Advanced Human Development and Neuroscience (3 Credits)
Advanced doctoral seminar in the biological bases of behavior. Identification of research problems and areas of application.
Prerequisite: EDHD775; or permission of EDUC-Human Development and Quantitative Methodology department.
Credit Only Granted for: EDHD811 or EDHD875.
Formerly: EDHD811.

EDHD878 Applied Research and Strategies (3 Credits)
Examine current human development research literature, define a research problem and design and implement a research study or review in collaboration with faculty.
Prerequisite: EDMS651; or permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 6 credits if content differs.

EDHD888 Apprenticeship in Human Development Research (1-8 Credits)
Apprenticeship in Human Development research.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD889 Practicum in Human Development (3-9 Credits)
Field experience in applied human development at a professional level of competence in a particular role with appropriate supervision.
Prerequisite: Credit not to be granted for experience accrued prior to registration; and open only to degree and certificate-seeking graduate students.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 9 credits if content differs.

EDHD898 Pre-Candidacy Research (1-8 Credits)

EDHD899 Doctoral Dissertation Research (1-8 Credits)
Registration required to 12-18 hours for a Ph.D. dissertation.

EDHI - Education Leadership, Higher Ed and International Ed

EDHI488 Special Topics in Education Policy and Administration (1-3 Credits)
Special and intensive treatment of current topics and issues in education policy and administration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Repeatable to: 6 credits.
Formerly: EDPL488.

EDHI489 Field Experiences in Education (1-4 Credits)
Planned field experience in education-related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Formerly: EDPL489.

EDHI498 Special Problems in Education (1-3 Credits)
Available only to students who have definite plans for individual study of approved problems.
Prerequisite: Available only to students who have definite plans for individual study of approved problems.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Formerly: EDPL498.

EDHI499 Workshops, Clinics, and Institutes (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: Workshops conducted by the College of Education (or developed cooperatively with other colleges and universities) and not otherwise covered in the present course listing; clinical experiences in pupil-testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals, and supervisors.
Repeatable to: 6 credits.
Formerly: EDPA499.

EDHI600 Education and Society (3 Credits)
Education and Society is an introductory course to graduate studies in the Department of Education Policy and Leadership. Students consider how social institutions influence -- and in turn are influenced by -- education policies and practices.
Credit Only Granted for: EDHI600, EDPL600, or EDPS600.
Formerly: EDPL600.

EDHI605 Comparative Education (3 Credits)
Analyzes and compares leading issues in education in various countries of the world, particularly as they relate to crucial problems in American education.
Credit Only Granted for: EDHI605, EDPL605, or EDPS605.
Formerly: EDPL605.

EDHI606 Political Economy of Education in a Global Context (3 Credits)
Examination of alternative economics perspectives and their implications for education policy and practice internationally, from local to global levels. The connection of education to issues of development, inequality, poverty, gender, and race will be discussed.
Credit Only Granted for: EDHI606, EDPL606, or EDPS606.
Formerly: EDPL606.

EDHI607 Culture and Education in a Global Context (3 Credits)
Examines cultural theories and analyzes cultural influences in education. Course materials and discussion critically analyze cultural transmission and schooling practices. Also examined are politics of culture, multiculturalism, global cultural clashes, and educators as critical culture workers.
Credit Only Granted for: EDHI607, EDPL607, or EDPS607.
Formerly: EDPL607.

EDHI608 Gender and Education (3 Credits)
The course examines feminist theories on gender inequity, and analyzes social impacts on girls' and women's education. Also examined are women's ways of knowing, issues of race and class, gender and development, ecofeminism, and technology for women.
Credit Only Granted for: EDPL788B or EDPL608.
Formerly: EDPL608.

EDHI630 Analyzing Systemwide Education Policy (3 Credits)
Analysis of how assessments are made of systemwide education policy based on the approaches used in studies of national education policy by international agencies.
Credit Only Granted for: EDHI630, EDPL630, or EDPS630.
Formerly: EDPL630.

EDHI642 Management of Change in Educational Organizations (3 Credits)
Role of individual as a change agent; issues related to effecting change within organizational sub-systems and total systems are considered. Specific strategies for successful change in schools are addressed.
Credit Only Granted for: EDHI642, EDPL642, or EDPS642.
Formerly: EDPL642.

EDHI643 Management of Human Resources In Education (3 Credits)
Examination of knowledge and development of awareness and capabilities needed by educational leaders to promote student success by managing school system personnel needs. Emphasis on recruitment, selection and supervision as well as labor relations and collective bargaining.
Credit Only Granted for: EDHI643, EDPL643, or EDPS643.
Formerly: EDPL643.

EDHI650 Professional Seminar in Higher and Adult Education (3 Credits)
Introduction to higher and adult education as a field of study. Origins, current dimensions and problems, and emerging issues. Field trips to state and national capitols, and involvement in professional conferences.
Credit Only Granted for: EDHI650, EDPL650, or EDPS650.
Formerly: EDPL650.

EDHI652 Higher Education in American Society (3 Credits)
Examines the concepts of academic freedom, corporate autonomy and institutional accountability with emphasis on twentieth century relationships between higher education and government in the United States.
Credit Only Granted for: EDHI652, EDPL652, or EDPS652.
Formerly: EDPL652.

EDHI653 Organization and Administration of Higher Education (3 Credits)
Basic concepts and terminology related to organizational behavior and institutional governance structures. The governance and organization of higher education in the United States.
Credit Only Granted for: EDHI653, EDPL653, or EDPS653.
Formerly: EDPL653.

EDHI654 The Community and Junior College (3 Credits)
Historical development and philosophical foundations of community and junior colleges in America with emphasis on organizational and administrative structures in two year institutions and the clientele they serve.
Credit Only Granted for: EDHI654, EDPL654, or EDPS654.
Formerly: EDPL654.

EDHI657 History of Higher Education in the United States (3 Credits)
History of higher education in America from colonial times to the present with emphasis on expansion of higher education and the growing complexity of its structures, organization, and purposes.
Credit Only Granted for: EDHI657, EDPL657, or EDPS657.
Formerly: EDPL657.

EDHI660 Retention Theories and the Impact of College (3 Credits)
An introduction to retention theories an the college impact literature. The primary focus will be to examine the disciplinary and philosophical frameworks that have informed the development of leading theories and policies.
Credit Only Granted for: EDHI660, EDPL660, or EDPS660.
Formerly: EDPL660.

EDHI662 Research on Ethnic Minorities and Demographic Trends in Higher Education (3 Credits)
Current research on ethnic minority student populations including issues of access, campus climate, racial identity, achievement and motivation. In addition to student issues, course examines issues for faculty of color in higher education, curriculum and teaching, and leadership and governance. The application of broad demographic changes in the nation and their impact on higher education over time.
Credit Only Granted for: EDHI662, EDPL662, or EDPS662.
Formerly: EDPL662.

EDHI663 Philanthropy and Fundraising in Higher Education (3 Credits)
A critical look at how philanthropy and fundraising has affected American Higher Education. Topics will include: a history and overview of philanthropy, motivations of and traditions of giving in different populations, ethics, and critical issues within educational and advancement.
Credit Only Granted for: EDHI663 or EDHI788D.
Formerly: EDHI788D.

EDHI664 The College Experience (3 Credits)
Designed to provide students with an overview of the research and scholarship on two of the major stakeholders in higher education -- students and faculty. Examines the educational experiences of college students in and out of the classroom in higher education in the United States by focusing on what students learn and the different collegiate experiences that influence their learning.
Restriction: Permission of instructor. And must be in a major within EDUC-Counseling, Higher Education and Special Education department; or must be in a major within EDUC-Education Policy and Leadership department; or must be in a major within EDUC-Teaching, Learning, Policy and Leadership department.
Credit Only Granted for: EDHI664, EDPL664, or EDPS664.
Formerly: EDPL664.

EDHI665 College Access and Choice (3 Credits)
Examines the college-going process, how and why some students successfully navigate it, and what policies and programs can help students from disadvantaged or underrepresented backgrounds overcome barriers to college access and entry.
Credit Only Granted for: EDHI665 or EDHI788L.
Formerly: EDHI788L.

EDHI666 The Academic Profession (3 Credits)
Explores how faculty demographics, discipline, graduate socialization, and organizational context (institutional type, mission, and culture) matter to critical higher edcuation outcomes, such as student learning, community engagement, research, shared governance and access and equity.
Credit Only Granted for: EDHI666 or EDHI788P.
Formerly: EDHI788P.

EDHI667 Women in Higher Education (3 Credits)
A comprehensive overview of the history, present condition, and current research on women students, faculty, adminstrators, and staff in higher education. Explores why and how women and men experience higher educaton differently, by drawing on historical, cultural, and psychological contexts, feminist theoretical and research perspectrives and recent research in various disciplines.
Credit Only Granted for: EDHI667 or EDHI788A.
Formerly: EDHI788A.

EDHI672 Modes of Inquiry in Education Research (3 Credits)
Introduction to modes of inquiry appropriate to research on issues and problems in education. Examination of qualitative, quantitative and mixed research methods and designs with a focus on related standards of quality.
Credit Only Granted for: EDHI672, EDPL672, or EDPS672.
Formerly: EDPL672.

EDHI673 Economic Evaluation of Education (3 Credits)
Examination and application of economic approaches - cost, cost-effectiveness, and cost-benefit analysis - to the evaluation of education programs and policies.
Credit Only Granted for: EDHI673, EDPL673, or EDPS673.
Formerly: EDPL673.

EDHI674 Minority Serving Institutions (3 Credits)
Definitions and designations of Minority Serving Institutions vary; however they traditionally include Historically Black Colleges and Universities, Hispanic-Serving Institutions, and Tribal Colleges and Universities. Exploring these institutions as well as some non-traditional MSIs including, Deaf Serving Institutions and Asian American and Pacific Islander Serving Institutions.
Credit Only Granted for: EDHI674 or EDHI788Q.
Formerly: EDHI788Q.

EDHI677 Ranking System in Higher Education: How They Work and Why They Matter (3 Credits)
A critical examination of domestic and international university rankings systems from their historic origins to current day. Students explore the criteria used to identify quality, the methods used to collect data, and the impact of ranking systems on institutional decision-making.
Credit Only Granted for: EDHI677 or EDHI788W.
Formerly: EDHI788W.

EDHI679 Master's Seminar (3 Credits)
Directed study for master's degree students writing seminar papers.
Formerly: EDPL679.

EDHI680 Gender, Development, and Education (3 Credits)
Focusing on gender as an analytical frame and a discrete variable, a comprehensive view of the relationship between gender and education in the context of national development is presented. It identifies the conditions of men and women's education and policy efforts to promote equity and social transformation.
Credit Only Granted for: EDHI674, EDHI680 or EDHI788K.
Formerly: EDHI788K.

EDHI681 Education for Global Peace (3 Credits)
This course will examine how education can address the threats of violence and wars. It prepares students to teach about peace, nonviolence, and conflict resolution, and also to analyze and implement changes in school and society to contribute to peace and non-violence.
Credit Only Granted for: EDHI681, EDPL681, or EDPS681.
Formerly: EDPL681.

EDHI682 Ecological Ethics and Education (3 Credits)
An exploration of the paradigms, approaches, and ways of knowing offered through ecological ethics and environmental sustainability education.
Credit Only Granted for: EDHI682 or EDHI788E.
Formerly: EDHI788E.

EDHI683 World Religions and Their Implications for Education (3 Credits)
Students develop a basic understanding of world religions, looking at their orgins, development, teachings, and primary figures. Students explore the roles, meaning, purpose that education plays in the various religions and examine their implications for education in the 21st century.
Credit Only Granted for: EDHI683 or EDHI788C.
Formerly: EDHI788C.

EDHI684 Alternative Education, Alternative Development (3 Credits)
A critical examination of the political economy of education and international development policies and practices. Focus is on the implications of these critiques for alternative education and development policies and practices.
Recommended: EDHI606.
Credit Only Granted for: EDHI684 or EDHI788D.
Formerly: EDHI788D.

EDHI689 Practicum In Educational Administration and Supervision (1-3 Credits)
Promotes skill development in managerial, leadership and supervisory areas. Practicum is based on results of diagnostic instruments and an individual professional development plan.
Repeatable to: 3 credits if content differs.
Formerly: EDPL689.

EDHI700 Qualitative Research Methods in Education (3 Credits)
Qualitative methods in education research, emphasizing the paradigms of philosophy, history, sociology, anthropology, and comparative studies as they rely on narrative rather than quantitative ordering of data.
Credit Only Granted for: EDHI700, EDPL700, or EDPS700.
Formerly: EDPL700.

EDHI704 Issues and Institutions in International Educational Development (3 Credits)
Examines the role of educational institutions in international development and the issues involved in educational planning and policymaking at the local, national and international levels.
Credit Only Granted for: EDHI704, EDPL704, or EDPS704.
Formerly: EDPL704.

EDHI710 Globalization and Education (3 Credits)
Multiple education policies, practices, and innovations linked to economic, technological, and cultural dimensions of globalization are affecting education systems. The consequences of such forces on educational equality, equity, and quality, noting similarities and differences between industrialized and developing countries will be explored.
Recommended: EDHI605.
Credit Only Granted for: EDHI710 or EDHI788J.
Formerly: EDHI788J.

EDHI713 Non-Formal Education (3 Credits)
An examination of forms of education outside the formal education system--known generally as nonformal (NFE) education and including popular education--to identify how these forms can assist marginalized populations in both Third World and industrialized countries to improve their quality of life and undertake collective action for social advancement.
Recommended: EDHI605.
Credit Only Granted for: EDHI707, EDHI713 or EDHI788N.
Formerly: EDHI788N.

EDHI725 Education in East Asia (3 Credits)
The course traces the cultural and intellectual history of education in East Asia, and examine features and important issues in East Asian education systems. School reform and social changes are studied.
Credit Only Granted for: EDHI725, EDPL725, or EDPS725.
Formerly: EDPL725.

EDHI743 Leadership Theory (3 Credits)
Critical analysis of contemporary leadership theoretical constructs. Consideration of implications for organizational improvement.
Prerequisite: EDHI642.
Credit Only Granted for: EDHI743, EDPL743, or EDPS743.
Formerly: EDPL743.

EDHI744 Organizational Theory in Research and Practice (3 Credits)
This course provides an overview of the study of organizations for graduate students interested in education and social policy. Class lectures focus on contrasting theories and critiquing application of theories to social policy problems with an emphasis on education. Case materials focus on a variety of organizational areas including: schools, hospitals, non-profit community based organizations, the arts, elected bodies, higher education and private business.
Credit Only Granted for: EDHI744, EDPL744, or EDPS744.
Formerly: EDPL744.

EDHI750 International Higher Education (3 Credits)
Comparison of higher education systems in several countries, and of the problems and issues in higher education faced by these countries.
Credit Only Granted for: EDHI750, EDPL750, or EDPS750.
Formerly: EDPL750.

EDHI752 State Systems of Higher Education (3 Credits)
Creation, operation, alteration and evaluation of state systems of higher education. Campus autonomy versus public accountability. Analysis of topics such as state planning, budget and program review, and administration of student aid and federal programs.
Credit Only Granted for: EDHI752, EDPL752, or EDPS752.
Formerly: EDPL752.

EDHI754 Higher Education Finance (3 Credits)
Economic perspectives on higher education. Ways of financing higher education and current finance issues. Higher education budget concepts and processes.
Credit Only Granted for: EDHI754, EDPL754, or EDPS754.
Formerly: EDPL754.

EDHI755 Federal Policies in Post-Secondary Education (3 Credits)
Evolution of the federal role, its current scope and funding. Policy issues associated with federal student aid programs, research grants and social equity regulations.
Credit Only Granted for: EDHI755, EDPL755, or EDPS755.
Formerly: EDPL755.

EDHI759 Seminar in Adult and Continuing Education (3 Credits)
Current issues and problems in adult and continuing education and lifelong learning in America.
Formerly: EDPL759.

EDHI788 Special Topics in Education Policy and Administration (1-3 Credits)
Special and intensive treatment of current topics and issues in education policy and administration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Repeatable to: 6 credits.

EDHI789 Doctoral Practicum in Administration and Supervision (1-3 Credits)
Experiential activities designed to enhance student skills. Based on Individual Professional Development Plan for each student.
Repeatable to: 3 credits if content differs.
Formerly: EDPL789.

EDHI798 Special Problems in Education (1-6 Credits)
Master's, AGS, or doctoral candidates who desire to pursue special research problems under the direction of their advisors may register for credit under this number.
Formerly: EDPL798.

EDHI799 Master's Thesis Research (1-6 Credits)

EDHI805 Seminar in Comparative Education (3 Credits)
Analysis of educational issues on a worldwide basis with opportunities to focus on a particular country on an individual basis. Analysis of qualitative research methods as used in cross-cultural and comparative education studies.
Credit Only Granted for: EDHI805, EDPL805, or EDPS805.
Formerly: EDPL805.

EDHI839 Seminar in Teacher Education (3-6 Credits)
A problem seminar in teacher education.
Repeatable to: 6 credits.
Formerly: EDPL839.

EDHI853 Leadership in Higher Education (3 Credits)
Theories of organizational leadership applied to institutions of higher education.
Prerequisite: EDHI653.
Credit Only Granted for: EDHI853, EDPL853, or EDPS853.
Formerly: EDPL853.

EDHI855 Lifelong Learning Policy (3 Credits)
Policies and programs for training and continued learning in business and industry, government agencies, unions, professional societies, and nonprofit organizations.
Credit Only Granted for: EDHI855, EDPL855, or EDPS855.
Formerly: EDPL855.

EDHI862 Seminar: Theoretical Basis of Administrative Behavior (3 Credits)
Study of administrative behavior in educational institutions. Development of a research design for the study of administrative behavior in one educational institution.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDHI862, EDPL862, or EDPS862.
Formerly: EDPL862.

EDHI888 Apprenticeship in Education (1-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Formerly: EDPL888.

EDHI889 Internship in Education (3-8 Credits)
Internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Formerly: EDPL889.

EDHI895 Research Critique Seminar (3 Credits)
Critiques of research designs in preparation for the doctoral dissertation.
Credit Only Granted for: EDHI895, EDPL895, or EDPS895.
Formerly: EDPL895.

EDHI898 Pre-Candidacy Research (1-8 Credits)

EDHI899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 6-9 hours for an Ed.D. Project and 12-18 hours for a Ph.D. Dissertation.
Formerly: EDPL899.

EDMS - Measurement, Statistics, and Evaluation

EDMS410 Classroom Assessment (3 Credits)
Developing and using classroom assessments, including tests, performance assessments, rating scales, portfolios, observations and oral interactions; basic psychometric statistics; standard setting; grading; communicating assessment information; testing ethics; locating and evaluating measures; program evaluation and classroom research; assessments used for educational policy decisions.
Restriction: Junior standing or higher.

EDMS451 Introduction to Educational Statistics (3 Credits)
Introduction to statistical reasoning; location and dispersion measures; computer applications; regression and correlation; formation of hypotheses tests; t-test; one-way analysis of variance; analysis of contingency tables.
Restriction: Sophomore standing or higher.
Credit Only Granted for: BIOM301, BMGT230, CCJS200, ECON230, ECON321, EDMS451, GEOG306, GEOL351, GVPT422, INST314, JOUR405, PSYC200 or SOCY201. (These courses do not necessarily meet the same major requirements-check with your advisor to see which of these courses will count for your major).

EDMS489 Field Experiences in Measurement and Statistics (1-4 Credits)
Planned field experience in education-related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 4 credits.

EDMS498 Special Problems in Measurement and Statistics (1-3 Credits)
Available only to education majors who have formal plans for individual study of approved problems.
Prerequisite: Available only to education majors who have formal plans for individual study of approved problems.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 6 credits.

EDMS610 Classroom Assessment and Evaluation (3 Credits)
Develop the understandings and skills needed to validly, reliably, and accurately assess student learning and to provide focused leadership in the area of classroom assessment.

EDMS622 Theory and Practice of Standardized Testing (3 Credits)
Principles of interpretation and evaluation of aptitude, achievement, and personal-social instruments; theory of reliability and validity; prediction and classification; norm- and criterion-referenced testing concepts.
Prerequisite: EDMS451; or EDMS645.

EDMS623 Applied Measurement: Issues and Practices (3 Credits)
Measurement theory and its application at an intermediate level; test development, validation and interpretation; issues and recent developments in measurement.
Prerequisite: EDMS410. And EDMS645; or students who have taken courses with comparable content may contact the department.

EDMS626 Instrumentation (3 Credits)
Theory, development, and applications of various affective, cognitive, or behavioral measurement instruments and procedures, including questionnaire and test items, observational protocols, and cutting-edge innovative game and scenario-based assessments.
Prerequisite: EDMS623.

EDMS645 Quantitative Research Methods I (3 Credits)
Research design and statistical applications in educational research: data representation; descriptive statistics; estimation and hypothesis testing. Application of statistical computer packages is emphasized.

EDMS646 General Linear Models I (3 Credits)
A first post-introductory inferential statistics course, with emphasis on analysis of variance procedures and designs from within the general linear modeling framework. Assignments include student analysis of education and related data; application of statistical software packages is emphasized.
Prerequisite: EDMS645; or an equivalent introductory statistics course.

EDMS647 Causal Inference and Evaluation Methods (3 Credits)
Counterfactual (potential outcomes) framework for causal inference, design/analysis strategies for confounder control, and specific best-practice applications to the evaluation of programs.
Prerequisite: Must have completed or be concurrently enrolled in EDMS651.

EDMS651 General Linear Models II (3 Credits)
Multiple regression and correlation analysis; trend analysis; hierarchical and stepwise procedures; logistic regression; software for regression analysis.
Prerequisite: EDMS646; or students who have taken courses with comparable content may contact the department.

EDMS655 Introduction to Multilevel Modeling (3 Credits)
Introduction to multilevel models and methodology as strategies for modeling change and organizational effects.
Prerequisite: EDMS651; or students who have taken courses with comparable content may contact the department.

EDMS657 Exploratory Latent and Composite Variable Methods (3 Credits)
Development of models for exploratory factor analysis and their practical applications. Additional topics will draw from latent class analysis, cluster analysis, mixture models, canonical correlation, multidimensional scaling, and configural frequency analysis.
Prerequisite: EDMS651.

EDMS665 Data Analysis and Statistical Consulting (3 Credits)
Advanced data analysis procedures applied to real-world clients' problems arising in a wide variety of substantive research settings within and beyond education.
Prerequisite: EDMS651; or students who have taken courses with comparable content may contact the department.

EDMS722 Structural Modeling (3 Credits)
Statistical theory and methods of estimation used in structural modeling; computer program applications; multisample models; mean structture models; structural models with multilevel data (e.g., sampling weights, growth models, multilevel latent variable models).
Prerequisite: EDMS657.

EDMS724 Modern Measurement Theory (3 Credits)
Theoretical formulations of measurement from a latent trait theory perspective.
Prerequisite: EDMS623 and EDMS651.

EDMS738 Seminar in Special Problems in Measurement (1-3 Credits)
An opportunity for students with special interests to focus in depth on contemporary topics in measurement. Topics to be announced, but will typically be related to applied and theoretical measurement.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 3 credits.

EDMS747 Design of Program Evaluations (3 Credits)
Analysis of measurement and design problems in program evaluations.
Prerequisite: EDMS626, EDMS651, and EDMS647. Or permission of instructor; and permission of EDUC-Human Development and Quantitative Methodology department.

EDMS769 Special Topics in Applied Statistics in Education (1-4 Credits)
Designed primarily for students majoring or minoring in measurement, statistics or evaluation.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDMS771 Multivariate Data Analysis (3 Credits)
Principal components, canonical correlation, discriminant functions, multivariate analysis of variance/covariance and other multivariate techniques.
Prerequisite: EDMS651.

EDMS779 Seminar in Applied Statistics (1-3 Credits)
Enrollment restricted to students with a major or minor in measurement, statistics or evaluation. Seminar topics will be chosen by individual student interest.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department. And must be in Measurement, Statistics and Evaluation (Master's) program; or must be in Measurement, Statistics and Evaluation (Doctoral) program.
Repeatable to: 3 credits if content differs.

EDMS787 Bayesian Inference and Analysis (3 Credits)
Models and model fitting methods commonly used in Bayesian Inference, such as Markov Chain Monte Carlo methods (e.g., Gibbs, Metropolis Sampling), with applications within and beyond the social and behavioral sciences. Analytical and philosophical differences between Frequentist and Bayesian statistics will also be highlighted.
Prerequisite: EDMS651.
Credit Only Granted for: EDMS769B or EDMS787.
Formerly: EDMS769B.

EDMS798 Special Problems in Education (1-6 Credits)
Master's, EDMS majors, or doctoral candidates who desire to pursue special research problems under the direction of their advisors may register for credit under this number.
Restriction: Must be in Measurement, Statistics and Evaluation (Master's) program; or must be in Measurement, Statistics and Evaluation (Doctoral) program.

EDMS799 Master's Thesis Research (1-6 Credits)
Registration required to the extent of 6 credits.
Restriction: Must be in a major within EDUC-Human Development and Quantitative Methodology department.

EDMS879 Doctoral Seminar (1-3 Credits)
Seminar that supports analysis of doctoral projects and theses, and of other on-going research projects.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDMS889 Internship in Measurement and Statistics (3-12 Credits)
Provides internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Prerequisite: Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDMS898 Pre-Candidacy Research (1-8 Credits)

EDMS899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 12 credits.

EDPS - Education Policy Studies

EDPS401 Educational Policy, and Social Change (3 Credits)
An examination of education policy in relation to the social environment and change. Contemporary education and social issues are examined, including technology as a complex force which influences social change. This is a Social Foundations course.
Credit Only Granted for: EDPL401 or EDPS401.
Formerly: EDPL401.

EDPS610 History of Western Education (3 Credits)
Educational institutions through the ancient, medieval and early modern periods in western civilization, as seen against a background of socio-economic development.
Credit Only Granted for: EDHI610, EDPL610, or EDPS610.
Formerly: EDPL610.

EDPS623 Education Policy and Theories of Change (3 Credits)
The work of change theorists in history, economics, political science, philosophy, sociology and anthropology as it impinges upon education policy.
Credit Only Granted for: EDHI623, EDPL623, or EDPS623.
Formerly: EDPL623.

EDPS626 Educatin Policy and the Young (3 Credits)
The systematic exploration of education policy as it has organized, reflected and influenced the lives of children, youth, and families, with particular emphasis on American policies and systems.
Credit Only Granted for: EDHI626, EDPL626, or EDPS626.
Formerly: EDPL626.

EDPS636 Communication and the School Curriculum (3 Credits)
Curriculum development based on communication as the major vehicle for describing the learner's interactions with persons, knowledge, and materials in the classroom and school environment.
Credit Only Granted for: EDHI636, EDPL636, or EDPS636.
Formerly: EDPL636.

EDPS663 Policy Formulation in Education (3-6 Credits)
Various levels of school governance. Analysis of policy formation, administration and evaluation issues.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department.
Credit Only Granted for: EDHI663, EDPL663, or EDPS663.
Formerly: EDPL663.

EDPS712 Analysis of Educational Concepts (3 Credits)
Analyses of selected concepts used in thinking about education.
Credit Only Granted for: EDHI712, EDPL712, or EDPS712.
Formerly: EDPL712.

EDPS811 Seminar in History of Education (3 Credits)
Examination of current developments and continuing controversies in the field of history of education. The analysis of the various ways in which history of education is approached methodologically and interpretatively.
Credit Only Granted for: EDHI811, EDPL811, or EDPS811.
Formerly: EDPL811.

EDPS812 Seminar in Philosophy of Education (3 Credits)
Examination of current developments and continuing controversies in the field of philosophy of education. The function of educational philosophy, methodological approaches, and current research trends.
Credit Only Granted for: EDHI812, EDPL812, or EDPS812.
Formerly: EDPL812.

EDPS813 Seminar in Educational Sociology (3 Credits)
Sociological analysis of educational processes and institutions; emphasis on the social effects of formal organizations.
Credit Only Granted for: EDHI813, EDPL813, or EDPS813.
Formerly: EDPL813.

EDSP - Education, Special

EDSP400 Instruction of Students with Severe Disabilities I (3 Credits)
Functional assessment procedures and instructional methods for students with severe disabilities.
Restriction: Must be in Special Education program. Also offered as: EDSP602.
Credit Only Granted for: EDSP400 or EDSP602.

EDSP401 Teaching Students with Disabilities in Elementary Classrooms (3 Credits)
This course is designed for elementary education majors to prepare for teaching students with disabilities in elementary classrooms. The course examines the legal requirements for general education teachers in the public schools including best practices for participating in the Individual Education Program (IEP) team process, and understanding Response to Intervention (RTI) as a approach to the early identification and support of students with learning and behavior needs. Information is provided on the characteristics of students who have been identified as having high incidence disabilities (e.g., learning disabilities, attention deficit hyperactivity disorder, speech and language delays, emotional or behavioral disorders, and other health impairments). The course then provides information on universal design (UDL) principles for learning, instructional suggestions to include students with disabilities in the general classroom, co-teaching and methods for integrating technology and assistive technology to benefit all students.
Restriction: Permission of EDUC-Special Education department.
Credit Only Granted for: EDSP401 or EDSP499F.
Formerly: EDSP499F.

EDSP402 Field Placement: Severe Disabilities I (2-5 Credits)
Practicum experience in settings serving students with severe disabilities.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP403 Instruction of Students with Physical Disabilities (3 Credits)
Assessment, curriculum, and instruction for students with physical disabilities. Focus on etiology, environmental and learning adaptations, and assistive technology.
Prerequisite: EDSP400 or EDSP602. Also offered as: EDSP603.
Credit Only Granted for: EDSP403 or EDSP603.

EDSP404 Education of Students with Autism Spectrum Disorders (3 Credits)
Characteristics, needs, assessment, and educational methods for students with autism spectrum disorders.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Also offered as: EDSP604.
Credit Only Granted for: EDSP404 or EDSP604.

EDSP410 Instruction of Students with Severe Disabilities II (3 Credits)
Functional assessment, curriculum, and instruction related to academic and community functioning skills for students with severe disabilities.
Restriction: Must be in Special Education program. Also offered as: EDSP614.
Credit Only Granted for: EDSP410 or EDSP614.

EDSP411 Universal Design for Learning (3 Credits)
Universal Design for Learning addresses a foundation framework for teacher candidates to learn how to design and implement instruction for a broad range of students with diverse needs rather than rely exclusively on accommodations to instruction for some students.
Prerequisite: EDSP210 or EDSP470.
Restriction: Must be in Special Education program.

EDSP413 Behavior and Classroom Management in Special Education (3 Credits)
Use of applied behavior analysis for assessment of behavior and learning environments. Design of behavior and classroom management of students in special education.
Restriction: Must be in Special Education program. Also offered as: EDSP613.
Credit Only Granted for: EDSP413, or EDSP613.

EDSP415 Assessment in Special Education (3 Credits)
Knowledge and skills for understanding assessment process and interpretation of assessment data. Emphasis on psychometric aspects of assessment related to screening, eligibility, and program planning.
Recommended: STAT100; or SOCY201.
Restriction: Must be in Special Education program. Also offered as: EDSP615.
Credit Only Granted for: EDSP415, or EDSP615.

EDSP416 Reading and Writing Instruction in Special Education I (3 Credits)
Assessment and instruction of reading and writing skills for students in special education.
Restriction: Must be in Special Education program. Also offered as: EDSP616.
Credit Only Granted for: EDSP416 or EDSP616.

EDSP417 Reading Diagnosis and Assessment (3 Credits)
Reading Diagnosis and Assessment prepares teacher candidates to assess children in general and special early childhood educations settings in the areas of reading and writing in order to plan for instruction. The course will focus on diagnostic, screening, progress monitoring, and outcome assessments in early and beginning literacy. The course is designed to provide participants with the knowledge and skills necessary to collect and use a wide range of assessment data in general education and special education settings. Includes field experience.
Prerequisite: EDSP423, EDHD431, and EDSP315; and track 1: Must have completed EDSP430 and EDSP433; OR Track 2: Must have completed EDHD415 and EDHD424.
Corequisite: EDHD322, EDHD323, EDSP321, EDHD441, EDHD442, EDHD443, and EDHD444.

EDSP420 Child Development, Birth to Three Years (3 Credits)
Child development theory and research, as well as knowledge about typical and atypical development of children from birth to three years of age. The course emphasizes learning for children with and without disabilities, and for children who are at risk due to poverty and other environmental factors. The course will introduce how children develop and the challenges they face within the domains of physical, cognitive, language, social, and emotional development, with particular attention paid to the impact of risk factors on development. Students will become familiar with delays and differences in development that may occur as the result of disability. Finally, students will learn the effects of cultural and linguistic differences on growth and development. Information about theory and research in child development for children with and without disabilities will be enhanced through a series of observational experiences, which will build upon concepts addressed during class. Includes field experiences.
Prerequisite: EDHD210 and EDHD220.
Corequisite: EDHD425 and EDHD314.
Restriction: Must be in Special Education program. Also offered as: EDHD434.
Credit Only Granted for: EDHD419A, EDSP420 or EDHD434.

EDSP421 Field Placement in Special Education: Early Childhood I (2-4 Credits)
Field experience I in early childhood special education.
Restriction: Must be in Special Education program; or must be in one of the following programs (Special Education (Doctoral); Special Education (Master's)).

EDSP422 Curriculum and Instruction: Early Childhood Special Education (3 Credits)
Curriculum and instruction for young children with mild and moderate disabilities, preschool through primary grades.
Restriction: Must be in Special Education program. Also offered as: EDSP627.
Credit Only Granted for: EDSP422 or EDSP627.

EDSP423 Early Childhood Special Education Assessment and Instruction (3 Credits)
Assessment procedures for infants and young children with disabilities, birth through grade 3.
Restriction: Must be in Special Education program.
Credit Only Granted for: EDSP423 or EDSP624.

EDSP424 Field Placement in Special Education: Early Childhood II (2-4 Credits)
Field experience in early childhood special education.
Restriction: Must be in Special Education program.

EDSP430 Intervention for Infants and Toddlers with Disabilities (3 Credits)
Intervention with infants and young children with disabilities. Focus on moderate and severe disabilities.
Restriction: Must be in Special Education program.
Credit Only Granted for: EDSP430 or EDSP631.

EDSP433 Families and Culture in Early Intervention (Birth-5) (3 Credits)
Provides students with the skills and information they need to work effectively with families of young children (birth to age 5) who have or are at risk for disabilities in early childhood or early intervention programs. Students will review current local, state and federal policies establishing the rights of families of infants and young children with disabilities to participate in decision making for their child. We will discuss relevant theoretical and research literature as well as the cultural and contextual issues involved in working with families of very young children. Includes field experiences.
Prerequisite: EDHD314 and EDHD425; and (EDHD419 or EDSP420).
Corequisite: EDSP430, EDSP315, and EDHD431.

EDSP434 Field Placement in Special Education: Secondary Middle I (2-4 Credits)
Field experience in secondary middle special education.
Restriction: Must be in Special Education program.

EDSP435 Field Placement in Special Education: Secondary Middle II (2-4 Credits)
Field experience in secondary middle special education.
Restriction: Must be in Special Education program.

EDSP443 Language and Literacy Acquisition in Children with Disabilities (3 Credits)
Language and literacy acquisition and characteristics of typical and atypical language development in supporting students with reading and writing disabilities.
Restriction: Must be in Special Education program.
Additional Information: This course is the first of four reading courses required by the Maryland State Department of Education for teacher certification in Special Education.

EDSP450 Inclusive Practices in the Schools (3 Credits)
Educational practices regarding inclusive education in the schools for students with and without disabilities.Also offered as: EDSP606.
Credit Only Granted for: EDSP450 or EDSP606.

EDSP451 Curriculum and Instruction: Elementary/Middle Special Education (3 Credits)
Methods for instruction of students with disabilities in the general education curriculum. Collaboration with other professionals is included.
Restriction: Must be in Special Education program. Also offered as: EDSP652.
Credit Only Granted for: EDSP451 or EDSP652.

EDSP452 Internship I: Elementary/Middle Special Education (2-4 Credits)
Field experience in elementary/middle school special education.
Restriction: Must be in Special Education program. Also offered as: EDSP692.
Credit Only Granted for: EDSP452 or EDSP692.

EDSP453 Methods and Models of Instruction: Elementary Special Education (3 Credits)
Focus on models and methods of instruction responsive to the cognitive, linguistic, and cultural characteristics of elementary students in special education.
Restriction: Must be in Special Education program. Also offered as: EDSP653.
Credit Only Granted for: EDSP453 or EDSP653.

EDSP454 Field Placement in Special Education: Elementary II (2-4 Credits)
Field experience in elementary special education.
Restriction: Must be in Special Education program.

EDSP455 Assessment in Elementary Special Education (3 Credits)
Focus on selection, administration, and interpretation of assessment tools and results for designing instruction and evaluating progress of elementary students in special education.
Restriction: Must be in Special Education program. Also offered as: EDSP654.
Credit Only Granted for: EDSP455 or EDSP654.

EDSP466 Issues and Models of Instruction: Middle/Secondary Special Education (3 Credits)
Issues, legislation, and service models in middle/secondary special education. Emphasis on career and vocational education, self-determination, and transition.
Restriction: Must be in Special Education program. Also offered as: EDSP664.
Credit Only Granted for: EDSP466 or EDSP664.

EDSP470 Introduction to Special Education (3 Credits)
Designed to give an understanding of the needs of all types of exceptional children.
Restriction: Must not have completed EDSP210.
Credit Only Granted for: EDSP210 or EDSP470.

EDSP474 Assessment in Middle/Secondary Special Education (3 Credits)
Cognitive, vocational, and social assessment for students with disabilities. Emphasis on interpretation of assessment results and case management practices.
Restriction: Must be in Special Education program. Also offered as: EDSP674.
Credit Only Granted for: EDSP474 or EDSP674.

EDSP476 Communicating with Sign Language (3 Credits)
Intermediate level receptive/expressive skills in American Sign Language. Aspects of the culture, history, and research perspectives of the deaf community.
Prerequisite: EDSP376.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP477 Curriculum, Assessment, and Instruction: Middle/Secondary Special Education (3 Credits)
Methods and assessment practices for effective instruction in middle and secondary content areas for students in special education.
Restriction: Must be in Special Education program. Also offered as: EDSP677.
Credit Only Granted for: EDSP477 or EDSP677.

EDSP481 Cultural Diversity and Disability (3 Credits)
A study of diversity issues within special education, with attention to uses of race, culture, and disability as they pertain to teaching, learning, and social justice.
Restriction: Must be in Special Education program. Also offered as: EDSP681.
Credit Only Granted for: EDSP481, EDSP499C, EDSP678C, or EDSP681.
Formerly: EDSP499C.

EDSP482 Literacy Approaches for At-Risk Adolescents (3 Credits)
Provides approaches to teaching reading in the content areas for secondary students with disabilities.
Prerequisite: Must have completed or be concurrently enrolled in EDHD426.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Also offered as: EDSP682.
Credit Only Granted for: EDSP482 or EDSP682.

EDSP484 Reading and Writing Instruction in Special Education II (3 Credits)
Focus on the development of reading and writing programs for students in special education. Builds on foundations established in EDSP416.
Prerequisite: EDSP416.
Restriction: Must be in Special Education program. Also offered as: EDSP684.
Credit Only Granted for: EDSP484 or EDSP684.

EDSP485 Assessment and Instruction in Mathematics in Special Education (3 Credits)
Instructional methods and assessment in mathematics in special education.
Restriction: Must be in Special Education program; or must be in one of the following programs (Special Education (Doctoral); Special Education (Master's)). Also offered as: EDSP683.
Credit Only Granted for: EDSP485 or EDSP683.

EDSP486 Promoting Prosocial Behavior in Special Education (3 Credits)
Focus on social development among students with and without disabilities, the relationship between pedagogy and student behavior, and classroom, school, and community approaches for developing prosocial behavior.
Restriction: Must be in Special Education program. Also offered as: EDSP686.
Credit Only Granted for: EDSP486 or EDSP686.

EDSP487 Family Partnerships in Special Education (3 Credits)
Strategies for communicating and working with families of students with disabilities.
Restriction: Must be in Special Education program. Also offered as: EDSP687.
Credit Only Granted for: EDSP487 or EDSP687.

EDSP488 Selected Topics in Teacher Education (1-3 Credits)

EDSP489 Field Experiences in Special Education (1-4 Credits)
Planned field experience in education-related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP490 Teacher Candidate Research Seminar in Special Education (3 Credits)
Study of current issues and research concerning the education of students in special education.
Restriction: Must be in Special Education program.

EDSP494 Internship: Early Childhood Special Education (6-12 Credits)
Student teaching, full-time for twelve weeks, with infants or preschool children with disabilities.
Restriction: Must be in Special Education program.

EDSP495 Internship II: Elementary/Middle Special Education (6-12 Credits)
Student teaching, full-time for 15 weeks, with elementary or middle school students with disabilities.
Corequisite: EDSP490.
Restriction: Must be in Special Education program; or must be in one of the following programs (Special Education (Doctoral); Special Education (Master's)). Also offered as: EDSP695.
Credit Only Granted for: EDSP 495 or EDSP 695.

EDSP496 Internship: Middle/Secondary Special Education (6-12 Credits)
Student teaching, full-time for twelve weeks, with middle or high school age students with disabilities.
Restriction: Must be in Special Education program.

EDSP498 Special Problems in Special Education (1-6 Credits)
Available only to education majors who have definite plans for individual study of approved problems. Credit according to extent of work.
Prerequisite: Available only to education majors who have definite plans for individual study of approved problems.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP499 Workshops, Clinics, and Institutes in Special Education (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: workshops conducted by the special education department (or developed cooperatively with other departments, colleges and universities) and not otherwise covered in the present course listing. Laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals and supervisors.
Repeatable to: 6 credits if content differs.

EDSP600 Issues and Trends in Educating Individuals with Disabilities (3 Credits)
Examines research and practice relevant to the education of individuals with disabilities.
Prerequisite: 9 credits in EDSP courses.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP602 Instruction of Students with Severe Disabilities I (3 Credits)
Functional assessment procedures and instructional methods for students with severe disabilities.
Restriction: Must be in Special Education (Master's) program.
Credit Only Granted for: EDSP400 or EDSP602.

EDSP603 Instruction of Students with Physical Disabilities (3 Credits)
Assessment, curriculum, and instruction for students with physical disabilities. Focus on etiology, environmental and learning adaptations, and assistive technology.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Also offered as: EDSP403.
Credit Only Granted for: EDSP403 or EDSP603.

EDSP604 Education of Students with Autism Spectrum Disorder (3 Credits)
Characteristics, needs, assessment, and educational methods for students diagnosed as autistic or having a pervasive development disorder.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Also offered as: EDSP604, EDSP604.
Credit Only Granted for: EDSP404 or EDSP604.

EDSP605 The Exceptional Child and Society (3 Credits)
Relationship of the role and adjustment of the child with an exceptionality to societal characteristics.
Prerequisite: EDSP600.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP606 Advanced Study in Inclusive Practices in The Schools (3 Credits)
Educational practices regarding inclusive education in the schools for students with and without disabilities.Also offered as: EDSP450.
Credit Only Granted for: EDSP450, EDSP606, or EDSP788P.
Formerly: EDSP788P.

EDSP607 School Violence and Disruption (3 Credits)
An examination of school violence and disruption from multiple perspectives. Societal, community, and individual factors are examined. Prevention strategies, interagency collaboration, and intervention techniques are addressed.

EDSP612 Transition Methods and Disability Systems (3 Credits)
Philosophical and historical foundatins of transition service delivery and current methods that comprise transition services for students with disabilities.
Restriction: Permission of instructor.

EDSP613 Behavior and Classroom Management in Special Education (3 Credits)
Applied behavior analysis for assessment of behavior and learning environments. Behavior and classroom management strategies for students in special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program; or permission of instructor. Also offered as: EDSP413.
Credit Only Granted for: EDSP413 or EDSP613.

EDSP614 Instruction of Students with Severe Disabilities II (3 Credits)
Functional assessment, curriculum, and instruction related to academic and community functioning skills for students with severe disabilities.
Restriction: Must be in Special Education (Master's) program.
Credit Only Granted for: EDSP410 or EDSP614.

EDSP615 Evaluation and Measurement of Exceptional Children and Youth (1-3 Credits)
Deals with the understanding and interpretation of the results of psychological and educational tests applicable for use with exceptional children and youth.
Prerequisite: EDSP600 and EDMS646; or permission of EDUC-Counseling, Higher Education and Special Education department. Also offered as: EDSP415.
Credit Only Granted for: EDSP415 or EDSP615.

EDSP616 Reading and Writing Instruction in Special Education I (3 Credits)
Assessment and instruction of reading and writing skills and strategies for students in special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Also offered as: EDSP416.
Credit Only Granted for: EDSP416 or EDSP616.

EDSP621 Designing Intensive Interventions for Social and Academic Skill Development for Students with Persistent Needs (3 Credits)
Prerequisite: EDSP 600, EDSP 601 or consent of instructor. Strategies to teach social and academic skills to behaviorally disordered students.
Prerequisite: EDSP600 and EDSP601; or permission of instructor.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP622 History, Research and Context in Behavioral and Learning Di sorders (3 Credits)
Examination of theoretical, historical, and contextual influences affecting the study and treatment of persons with behavioral and learning disorders.
Prerequisite: EDSP470.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP623 Challenges and Issues in Behavioral and Learning Disorders (3 Credits)
Development and outcomes for students with behavioral and learning disorders for inclusive schools, discipline, professional development and ethics.
Prerequisite: EDSP470.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP624 Assessment in Early Childhood Special Education (3 Credits)
Assessment procedures for infants and young children with disabilities, birth through age eight.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Also offered as: EDSP423.
Credit Only Granted for: EDSP423 or EDSP624.

EDSP625 Seminar on Severely Handicapping Conditions (3 Credits)
Research and theories relevant to the education of severely handicapped individuals.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP626 Characteristics of Infants and Young Children: Early Childhood Special Education (3 Credits)
Focus on developmental, behavioral, and learning characteristics of infants and young children with and without disabilities.Also offered as: EDSP420.
Credit Only Granted for: EDSP420 or EDSP626.

EDSP627 Curriculum and Instruction: Early Childhood Special Education (3 Credits)
Curriculum and instructor for young children with mild and moderate disabilities, preschool through primary grades.Also offered as: EDSP422.
Credit Only Granted for: EDSP422 or EDSP627.

EDSP631 Early Intervention: Early Childhood Special Education (3 Credits)
Intervention with infants and young children with disabilities. Focus on moderate and severe disabilities.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Also offered as: EDSP430.
Credit Only Granted for: EDSP430 or EDSP631.

EDSP652 Curriculum and Instruction: Elementary Special Education (3 Credits)
Methods for instruction of students with disabilities in the general education curriculum. Collaboration with other professionals is included.Also offered as: EDSP652, EDSP652.
Credit Only Granted for: EDSP451 or EDSP652.

EDSP654 Assessment in Elementary Special Education (3 Credits)
Focus on selection, administration, and interpretation of assessment tools and results for designing instruction and evaluating progress of elementary students in special education.Also offered as: EDSP455.
Credit Only Granted for: EDSP455 or EDSP654.

EDSP664 Issues and Models:Secondary/Middle Special Education (3 Credits)
Issues, legislation, and service models in secondary/middle special education. Emphasis on career and vocational education, self-determination, and transition.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Also offered as: EDSP466.
Credit Only Granted for: EDSP466 or EDSP664.

EDSP665 Families, Culture, and Disability (3 Credits)
Current research on service delivery and cultural factors that influence families of children and youth with disabilities.
Prerequisite: EDSP600.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP670 Single Subject Research Designs (3 Credits)
Design, application, and analysis of single subject research in special education classrooms across all disabilities.
Prerequisite: EDSP600.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP671 Qualitative Methodologies in Special Education (3 Credits)
Design and evaluation of qualitative research in special education across disabilities and ages.
Prerequisite: EDSP600.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP673 Evaluating Evidence-Based Practices in Special Education (3 Credits)
Evaluating evidence-based practices in special education, by examining theoretical origins, use of causal designs, programmatic lines of research, and research syntheses to explore the development of what it means for an intervention to have the potential to significantly impact practice.
Prerequisite: EDMS645.
Recommended: EDSP670 and EDSP600.
Credit Only Granted for: EDSP673 or EDSP798E.
Formerly: EDSP798E.

EDSP674 Assessment in Middle/Secondary Special Education (3 Credits)
Cognitive, vocational, and social assessment for students with disabilities. Emphasis on interpretation of assessment results and case management practices.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Also offered as: EDSP474.
Credit Only Granted for: EDSP474 or EDSP674.

EDSP675 Legal and Policy Foundations for Individuals with Disabilities (3 Credits)
Regulatory and statutory foundations for public policies addressing the education of children and youth with disabilities.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP677 Curriculum, Assessment, and Instruction: Middle/Secondary Special Education (3 Credits)
Methods and assessment practicies for effective instruction in middle and secondary content areas for students in special education.Also offered as: EDSP477.
Credit Only Granted for: EDSP477 or EDSP677.

EDSP678 Seminar in Special Education (3 Credits)

EDSP681 Seminar in Cultural Diversity and Disability (3 Credits)
A study of diversity issues within special education, with attention to issues of race, culture, and disability as they pertain to teaching, learning, and social justice.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Also offered as: EDSP481.
Credit Only Granted for: EDSP481 or EDSP681.

EDSP682 Advanced Literacy Approaches for At-Risk Adolescents (3 Credits)
Approaches to teaching reading in the content areas for secondary students with disabilities.Also offered as: EDSP482.
Credit Only Granted for: EDSP482, EDSP488R, EDSP682, or EDSP788R.
Formerly: EDSP788R.

EDSP683 Assessment and Instruction in Mathematics in Special Education (3 Credits)
Instructional methods and assessment in mathematics in special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Also offered as: EDSP485.
Credit Only Granted for: EDSP485 or EDSP683.

EDSP684 Reading and Writing Instruction in Special Education II (3 Credits)
Development of effective reading and writing programs for students receiving special education services. Builds on the foundation established in EDSP 616.
Prerequisite: EDSP616.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Also offered as: EDSP484.
Credit Only Granted for: EDSP484 or EDSP684.

EDSP686 Promoting Prosocial Behavior in Special Education (3 Credits)
Focuses on effective practices for social development among students with disabilities. Classroom, school, and community approaches for developing prosocial behavior are covered.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program; or permission of EDUC-Counseling, Higher Education and Special Education department. Also offered as: EDSP486.
Credit Only Granted for: EDSP486 or EDSP686.

EDSP687 Family Partnerships in Special Education (3 Credits)
Strategies for communicating and working with families of students with disabilities.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Also offered as: EDSP487.
Credit Only Granted for: EDSP487 or EDSP687.

EDSP690 Teacher Candidate Research Seminar in Special Education (3 Credits)
Required seminar for master's certification teacher candidates in special education focusing on research methods and applications with students having disabilities.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.

EDSP691 Graduate Internship in Special Education I: Early Childhood (2-4 Credits)
Internship I in early childhood special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.
Credit Only Granted for: EDSP431 and EDSP691.
Formerly: EDSP431.

EDSP692 Graduate Internship I: Elementary/Middle Special Education (2-4 Credits)
Field experience in elementary/middle school special education.
Restriction: Must be in Special Education (Master's) program.
Credit Only Granted for: EDSP452 or EDSP692.

EDSP693 Graduate Internship in Special Education I: Sceondary Middle (2-4 Credits)
Internship I in secondary middle special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.
Credit Only Granted for: EDSP436 or EDSP693.
Formerly: EDSP436.

EDSP694 Graduate Internship in Special Education II: Early Childhood (6-11 Credits)
Student teaching, full-time for twelve weeks, with infants or preschool children with disabilities.
Corequisite: EDSP690.
Restriction: Must be in Special Education program; or must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.
Credit Only Granted for: EDSP494, EDSP694, or EDSP889A.

EDSP695 Graduate Internship II: Elementary/Middle Special Education (6-11 Credits)
Student teaching, full-time for 15 weeks, with elementary or middle school students with disabilities.
Corequisite: EDSP690.
Recommended: Must be in Special Education (Master's) program EDSPM Special Education.
Restriction: Must be in Special Education (Master's) program.
Credit Only Granted for: EDSP495, EDSP695 or EDSP888A.

EDSP696 Graduate Internship in Special Education II: Secondary Middle (6-11 Credits)
Student teaching, full-time for twelve weeks, with students with disabilities in secondary or middle school settings.
Corequisite: EDSP690.
Restriction: Must be in Special Education program; or must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.
Credit Only Granted for: EDSP496, EDSP696, or EDSP889A.

EDSP788 Selected Topics in Special Education (1-3 Credits)
Current topics and issues in teacher education.
Repeatable to: 6 credits if content differs.

EDSP798 Special Problems in Special Education (1-6 Credits)
Intended for Master's, AGS, or doctoral students in education who desire to pursue a research problem.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP799 Master's Thesis Research (1-6 Credits)
Registration required to the extent of six hours for Master's thesis.

EDSP860 Doctoral Research Seminar (3 Credits)
Issues and procedures relevant to conducting and analyzing research in special education.

EDSP872 Theory and Empirical Design in Educational Research (3 Credits)
Design and evaluation of quantitative research in special education across disabilities and ages.
Prerequisite: EDMS645 and EDMS646; or permission of EDUC-Counseling, Higher Education and Special Education department.
Restriction: Must be in Special Education (Doctoral) program.
Credit Only Granted for: EDSP672 or EDSP872.
Formerly: EDSP672.

EDSP875 Policy Issues Affecting Individuals with Disabilities (3 Credits)
An analysis of current educational and disability issues and policies pertaining to children, youth, and adults with disabilities.
Restriction: Permission of instructor; or must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.

EDSP888 Apprenticeship in Special Education (1-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate- seeking graduate students.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP889 Internship in Special Education (3-8 Credits)
Internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP898 Pre-Candidacy Research (1-8 Credits)

EDSP899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 6-9 hours for an Ed.D. Project and 12-18 hours for a Ph.D. dissertation.

EDUC - Education

EDUC478 Using Information Technology in Schools (1-3 Credits)
Strategies, resources, tools and organizational concepts for using technology to facilitate classroom learning and school administrative functions.
Restriction: Permission of EDUC-College of Education; and junior standing or higher.
Repeatable to: 6 credits if content differs.

EDUC498 Selected Topics in Education (1-3 Credits)
Current topics and issues in education.
Restriction: Permission of EDUC-College of Education.
Repeatable to: 9 credits if content differs.

EDUC499 Honors Thesis (1-6 Credits)
Individual thesis work under supervision of faculty advisors; includes periodic seminar meetings with other honors students engaged in thesis work.
Prerequisite: Admission to College Honors Program.
Restriction: Permission of EDUC-College of Education.

EDUC640 Introduction to Educational Leadership (3 Credits)
The focus of this course is the analysis of the role of education administrators/leaders in the social, political, and legal contexts of schools. Also examines the role of leadership in school improvement.
Credit Only Granted for: EDHI640 or EDUC640.
Formerly: EDHI640.

EDUC645 Leading Instructional Improvement (3 Credits)
Development of knowledge and skills in the use of data bases, research findings and models of supervision, to improve instruction in schools.
Credit Only Granted for: EDHI645 or EDUC645.
Formerly: EDHI645.

EDUC646 Leading Instructional Excellence (3 Credits)
Leader's role in fostering high quality teaching and learning. Exploration of the relationship between curriculum instruction assessment and the organizational structure of K-12 public schooling. Development and assessment of frameworks for understanding instructional quality. Analysis of strategies for supporting teachers as they engage in curricular and professional development. Consideration of factors involved in creating and sustaining instructionally centered schools.
Prerequisite: EDUC645; or permission of instructor.
Credit Only Granted for: EDHI646 or EDUC646.
Formerly: EDHI646.

EDUC670 Learning Communities (3 Credits)
Reviews contemporary research on student and teacher learning and schools as learning organizations. It aims to build students understanding of opportunities and challanges to implementing learning environments in various educational organizations. Readings, cases and assignments emphasize students' understanding of learning theories and their application to various organizational settings.
Credit Only Granted for: EDHI670 or EDUC670.
Formerly: EDHI670.

EDUC671 Education Law, Finance and Policy (3 Credits)
An examination of the way judicial interpretation of common, statutory, and constitutional law shapes and constrains educational policy making. In addition, this course is designed to introduce students to issues related to the financing and resource management of public elementary and secondary schools and school systems in the United States. All discussions include dimensions of both theory and practice and specifically address reform in terms of alternatives to current practice.

EDUC689 Practicum In Educational Administration and Supervision (1-3 Credits)
Promotes skill development in managerial, leadership and supervisory areas. Practicum is based on results of diagnostic instruments and an individual professional development plan.
Repeatable to: 3 credits if content differs.

EDUC698 Advanced Topics in Education (1-3 Credits)
Arranged study on specific topics in education.
Restriction: Permission of EDUC-College of Education.
Repeatable to: 6 credits if content differs.

EDUC701 Applied Research and Data Based Decision Making for School Leaders (3 Credits)
This course focuses on understanding school system data including student assessments, teacher and administrator evaluations and other program data. Ed.D. students will learn to evaluate the technical characteristics and implications for use of such data as well as how to design instruments to collect needed data.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC701 or EDHI701.
Formerly: EDHI701.

EDUC702 Applied Research Design for Education Leaders (3 Credits)
Emphasizes quantitative and qualitative methodologies to investigate a range of educational problems. Designed for EdD doctoral students.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC702 or EDHI702.
Formerly: EDHI 702.

EDUC703 Conducting Library Research for Dissertations (2 Credits)
This course is designed to provide students in the Ed.D.doctoral program with the skills necessary to conduct library research in preparation for developing the literature review for the Dissertation in Practice.
Restriction: Permission of EDUC-College of Education.

EDUC704 Introduction to Writing the Dissertation in Practice (2 Credits)
This course is designed to provide students in the Ed.D. program with specific strategies and skills needed to complete their Dissertation of Practice. Skills include constructing a problem statement and developing a cohesive argument for a proposed solution.
Restriction: Permission of EDUC-College of Education.

EDUC705 Education Policy Making and the School Leader (4 Credits)
Course analyzes educational K-12 policies and their impacts on school systems and the leadership of those systems
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC705 or EDPL663.
Formerly: EDPL663.

EDUC740 Managing Educational Organizations in a Diverse Society (4 Credits)
Contemporary social and cultural influences that impact on the management of schools and school systems in a diverse society. The effects on schools and school systems of changes in the economy, family structure, demographics and technology will be examined.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC740 or EDHI740.
Formerly: EDHI740.

EDUC747 Advanced Seminar on Instructional Improvement for School Leaders (4 Credits)
Course addresses current issues, research, trends, and problems in the areas of instructional improvement and the responsibilities of school-based administrators in improving student learning.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC747 or EDHI747.
Formerly: EDHI747.

EDUC760 The Human Dimension in Administration (4 Credits)
Course focuses on theory, research findings, and current practices in managing human resources in educational organizations. Issues related to performance evaluations, professional development, and legal and ethical standards are addressed.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC760 or EDHI760.
Formerly: EDHI760.

EDUC767 Seminar on School District Leadership (3 Credits)
Examination of theory and research related to school district leadership with focus on improvement sciences. Course uses improvement science model to understand organizational, political, community, instructional problems of practice.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC767 or EDHI767.
Formerly: EDHI767.

EDUC769 System Innovation and Transformation (4 Credits)
Course is designed to provide EdD students understanding how complex systems improve performance and connect educational and social objectives to goals of innovation and efficiency.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC769 or EDHI788M.
Formerly: EDHI788M.

EDUC888 Applied Apprenticeship in Education (1-3 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals.
Restriction: Permission of EDUC-College of Education.
Repeatable to: 12 credits.

EDUC898 Pre-Candidacy Research (2-4 Credits)
Pre-Candidacy Research
Repeatable to: 12 credits.

EDUC899 Dissertation of Practice Research (1-6 Credits)
Registration required to the extent of 6-9 hours for an Ed.D. Dissertation.
Repeatable to: 9 credits.

EMBA - Executive MBA Program

EMBA610 Introduction to Financial Accounting (2 Credits)
Overview of financial accounting, periodic financial statements and the financial reporting process. Importance of financial statements as information source for creditors and investors and as a means by which managers can communicate information about their firms.
Restriction: Must be in Executive MBA program.

EMBA611 Managerial Accounting (2 Credits)
Use of accounting data in corporate planning and control. Cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Restriction: Must be in Executive MBA program.

EMBA616 Accounting for Senior Management (3 Credits)
This course is designed to give senior managers an overview of basic financial and managerial accounting principles and tools with emphasis on those principles and tools they can use to support various managerial decision-making tasks.
Restriction: Must be in Executive MBA program.

EMBA617 Accounting for Decision Making (4 Credits)
An overview of financial accounting including the emphasis on periodic financial statements, the financial reporting process, the importance of financial statements as (i) an information source for creditors and investors and (ii) a means by which managers can communicate information about their firms. Overview of managerial accounting in corporate planning and control. Specific facets include cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Restriction: Must be in Executive MBA program.

EMBA620 Strategic Information Systems (2 Credits)
Use of information technology to achieve competitive advantage, efficient operations, and effective decision making. Analysis of functions of information technology and its impact on competitive strategy and organizational operations.
Restriction: Must be in Executive MBA program.

EMBA621 Strategic and Transformational Information Technology (3 Credits)
Use of information technology to achieve competitive advantage, effcient operations, and effective decision making. Analysis of functions of information technology and its impact on competitive strategy and organizational operations.
Restriction: Must be in Executive MBA program.

EMBA630 Data Models and Decisions (3 Credits)
To develop probabilistic and statistical concepts, methods and models through examples motivated by real-life data from business and to stress the role that statistics play in the managerial decision making process.
Restriction: Must be in Executive MBA program.

EMBA637 Corporate Finance (4 Credits)
Presents key concepts in corporate finance as well as tools used in making corporate financial decisions. Topics include valuation of corporate securities, capital investment decision making, capital market theory, operation and efficiency of financial markets, corporate financing decisions, and risk management.
Restriction: Must be in Executive MBA program.

EMBA640 Financial Management (3 Credits)
Analysis of major corporate financial decisions using a market-oriented framework. Topics include capital budgeting, security portfolio theory, operation and efficiency of financial markets, options pricing, financing decisions, capital structure, payout policy and international finance.
Restriction: Must be in Executive MBA program.

EMBA647 Economics and Public Policy (4 Credits)
Introduction to the economic concepts essential to business decision-making. Concepts covered include supply, demand, cost pricing, competition, monopoly, non-competitive markets, game theory, vertical integration, regulation, national income accounting, fiscal policy, monetary policy, balance of payments accounting, exchange rates and international economics. Primary attention is given to cases.
Restriction: Must be in Executive MBA program.

EMBA650 Marketing Management (2 Credits)
Analysis of marketing problems and evaluation of specific marketing efforts regarding the organization's products and services, pricing activities, channel selection, and promotion strategies in both domestic and international markets.
Restriction: Must be in Executive MBA program.

EMBA654 Organizational Change (1-3 Credits)
This course is designed to assist you in developing the skills necessary to successfully manage change in a turbulent environment. As part of the course design, an overview of organizational change management strategies aimed at improving the organization's ability to cope with change will be covered. In addition, the course provides students with the models for understanding the dynamics of organizational change. Change management skills are among the most important skills that any professional can possess.
Restriction: Must be in Executive MBA program.

EMBA656 Leadership and Human Capital (3 Credits)
The overall objective of this course is to sensitize participants to the fact that managers face many dilemmas (such as the need to maintain control, yet be flexible enough to effectively change as the competitive environment requires); and therefore, managers need to have skills that will enable them to effectively manage and lead, and thus to become leader-managers. How managing versus leading-skills differ will be emphasized in this course. To raise participants' sensitivity to managerial dilemmas and the skills needed to effectively manage these, there will be extensive use of case discussions and video-clips about challenges faced by companies and their managers, and extensive opportunities for self-reflective and experiential exercises. The development of action-plans for implementing a desirable change in participants' current job-situation will also help participants to hone the skills needed to be effective change-agents, hence leaders, in their organization.
Restriction: Must be in Executive MBA program.

EMBA662 Leadership and Teamwork (2 Credits)
Course examines concepts of team-building and leadership which are critical to managerial success. Topics include leadership, decision-making, communication and conflict, work motivation, building effective teams, and organizational change and culture.
Restriction: Must be in Executive MBA program.

EMBA663 Managing Human Capital (2 Credits)
Course examines core human resource management principles and emphasizes skills for maximizing an organization's human capital. Topics include recruitment, selection, performance feedback and incentives, termination of poor performers, and managing organizational change through human resource systems and policies.
Restriction: Must be in Executive MBA program.

EMBA664 IT Transformation of Organizations, Industries and Markets (2 Credits)
Information technology enables the transformation of organizations, industries and markets. The purpose of this course is to understand the forces within organizations and industries that combine with the technology to create these transformations. The course focuses on general models of transformation as well as case studies of specific organizations and industries. Teams of students will select an industry and prepare a report on how technology is now or will transform it, and examine the implications for how businesses will function in the future.
Restriction: Must be in Executive MBA program.

EMBA674 Marketing Simulation (2 Credits)
This is a capstone marketing course that is taught primarily through the simulation MARKSTRAT. As we go through the simulation we will discuss marketing strategies designed to manage products in selected market segments. Topics covered include competitor analysis, buyer analysis, market segments, and product strengths and weaknesses; product related issues are identified and marketing strategies developed, assessed and implemented. The material is then complemented with the MARKSTRAT simulation. The prerequisite for this course is Marketing Management or Marketing Strategy.
Prerequisite: Must have completed Marketing Management or Marketing Strategy coursework.
Restriction: Must be in Executive MBA program.

EMBA678 Ethical Leadership (1-3 Credits)
This course will explore the following topics; Recognize the scope of managerial agency and the economic, legal and ethical responsibilities to various stakeholders, Conduct elementary ethical analyses of managerial situations using the principal schools of ethical reasoning, Identify the economic and ethical properties of a market mechanism, and the means for addressing the limitations of a market, and Recognize ethical leadership as the exercise of managerial agency in changing existing values and practices.
Restriction: Must be in Executive MBA program.
Repeatable to: 3 credits if content differs.

EMBA681 Managerial Economics and Public Policy (2 Credits)
Basic microeconomic principles used by firms, including supply and demand, elasticities, costs, productivity, pricing, marketing structure and competitive implications of alternative market structures. Market failures and government intervention. Public policy processes affecting business operations.
Restriction: Must be in Executive MBA program.

EMBA683 The Global Economic Environment (2 Credits)
Relationship between national and international economic environments. Determinants of output, interest rates, prices and exchange rates. Analysis of effect of economic policies (fiscal, monetary, trade, tax) on the firm and the economy.
Restriction: Must be in Executive MBA program.

EMBA688 Strategic Management (1 Credit)
This course aims to give you the tools, frameworks, and ideas necessary to develop business units and corporate strategies for your oraganizations that fit, both in the short run and long run. As noted above, this requires that we appreciate how best to analyze and identify profit opportunities and threats in different industies and competitive environments; how best to analyze and identify your organization's valuable assets, resources and capabilities and how they might be protected, leveraged, and extended inthe market; how to organize your firm to be best prepared to adapt its strategy over time as the market environment changes; how to use organic growth as well as mergers, acquisitions, joint ventures, alliances, and divestitures to ensure that your organization around its strategy to maximize the probability of successful strategy implementation.
Restriction: Must be in Executive MBA program.
Repeatable to: 3 credits if content differs.

EMBA690 Strategic Management (2 Credits)
Integrative strategic management focusing on strategy formulation and implementation in domestic and global settings. Industry and competitor analysis, industry and firm value chain, leadership, goal setting, organizational structure and culture. Case study approach to top management and organizational problems.
Restriction: Must be in Executive MBA program.

EMBA693 Supply Chain (2 Credits)
The age of the real-time supply chain has finally arrived. Companies can now connect instantaneously with suppliers, distributors, manufacturers, customers, and alliance partners around the world. On-line access to up-to-the minute information enables companies to improve communication and project management across the entire supply chain, promote collaboration across departments, and enhance customer service and financial operations. The results are stunning; for example, a recent survey reports dramatic increases in revenues and customer retention and decreases in operating costs and product cycle times. As competition heats up from every direction, the ability to design and manage your supply chain with precision and speed becomes a business imperative. This course offers a practical blueprint for building, implementing, and sustaining supply chains in today's rapidly changing environment.
Restriction: Must be in Executive MBA program.

EMBA694 Operations Management (2 Credits)
A firm has the opportunity to create competitive advantage through proficient management of its operations. To do so, the firm must first recognize and establish the strategic role of its operations within the organization. Then, at the more detailed operational level, the firm must execute effectively and efficiently. This course examines the strategic role that the operations function can play, and offers specific tools and techniques that the firm can use for strategy execution. We cover concepts of operations managment applied to both manufacturing and services, including operations strategy, analysis of process flows and bottlenecks, waiting line models, total quality management, six sigma, and revenue management.
Restriction: Must be in Executive MBA program.

EMBA711 Financial Planning and Control Systems (2 Credits)
The role accounting plays in planning and controlling issues within organizations. It takes a high-level view of planning and control and will encourage you to take a very broad view of the topic.
Restriction: Must be in Executive MBA program.

EMBA724 International Financial Management (3 Credits)
The role of financial management in the multinational firm. The financing and managing of foreign investments, assets, currencies, imports and exports. National and international financial institutions and markets.
Prerequisite: EMBA640.
Restriction: Must be in Executive MBA program.

EMBA751 Implementing Strategy (3 Credits)
Organizational dynamics of competitive advantage. Impact of alternative organizational structures, planning and control systems, human resource management practices, and executive leadership styles on the implementation of archetypically different strategies.
Restriction: Must be in Executive MBA program.

EMBA757 Marketing Strategy (3 Credits)
A capstone marketing course. Marketing strategies designed to manage products in selected market segments. Topics covered include competitor analysis, buyer analysis, market segments, and product strengths and weaknesses; product related issues are identified and marketing strategies developed, assessed and implemented.
Restriction: Must be in Executive MBA program.

EMBA758 Special Topics (2-3 Credits)
Selected advanced topics in the various fields of graduate study in business.
Restriction: Must be in Executive MBA program.
Repeatable to: 12 credits if content differs.

EMBA759 Independent Study (1-6 Credits)
Independent study for Masters students in Business.
Restriction: Must be in Executive MBA program.
Repeatable to: 12 credits if content differs.

EMBA778 Special Topics (2-3 Credits)
Selected advanced topics in the various fields of graduate study in business.

EMBA788 Executive Skills Mastery (1-2 Credits)
This course is designed to focus on the development of the specific set of skills that executives need to successfully perform in today's organizational environment. Students complete assessments which help to target their specific skill level and in the aggregate give instructors clear ideas on the needs of the cohort. The assessments also augment executive coaching, when provided. This is typically registered as a one credit course except when a particular program's cirriculum allocates enough contact hours to all course topics to be covered at a more advanced level.
Repeatable to: 12 credits if content differs.
Formerly: BMGT788A.

EMBA789 Leadership Mastery (1-2 Credits)
This course addresses organizational challenges from the CEO or C-level perspective. At this level, the ability to engage ambiguity and chaos effectively is essential. Creating strategy while using a systems approach and understanding how each functional area interacts with the other (with both the short-term and long-term in mind) are of very high importance. The course covers topics that consume the days of senior level leaders in organizations. This is typically registered as a one credit course except when a particular program's cirriculum allocates enough contact hours to all course topics to be covered at a more advanced level.
Repeatable to: 12 credits if content differs.
Formerly: BMGT788B.

EMBA798 Action Learning Project (1-2 Credits)
This course is designed to give the student the opportunity to work on a real-time, salient business challenge or issue for the sponsoring organization. This is often the student's employer. Students are encouraged to design projects which extend beyond a single functional area and require them to examine the interaction of multiple functional areas from a systems perspective. Students work in teams for the projects. This allows them to learn from one another, as well as to learn how to work more effectively in teams - especially in a largely virtual environment. This is typically a two credit course when projects are initiated and completed entirely within a single term. It may be a one credit course when projects extend over more than one term.
Repeatable to: 9 credits if content differs.

ENAE - Engineering, Aerospace

ENAE403 Aircraft Flight Dynamics (3 Credits)
Study of motion of aircraft, equations of motion, aerodynamic force representation, longitudinal and lateral motions, response to controls and to atmospheric disturbances, handling qualities criteria and other figures of merit.
Prerequisite: ENAE414 and ENAE432.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE404 Space Flight Dynamics (3 Credits)
Three-dimensional motion under central fields. Solutions to orbital motion, orbital elements, time elements. Kepler's laws. Orbital maneuvering, rendezvous and station-keeping. Rigid-body attitude dynamics, spacecraft attitude dynamics.
Prerequisite: ENAE301.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE414 Aerodynamics II (3 Credits)
Aerodynamics of inviscid incompressible flows. Aerodynamic forces and moments. Fluid statics/buoyancy force. Vorticity, circulation, the stream function and the velocity potential. Bernoulli's and Laplace's equations. Flows in low speed wind tunnels and airspeed measurement. Potential flows involving sources and sinks, doublets, and vortices. Development of the theory of airfoils and wings.
Prerequisite: ENAE311.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department. And junior standing or higher.

ENAE415 Helicopter Theory (3 Credits)
Elementary exposition on the theory and practice of aerodynamics applied to helicopters and other rotary wing aircraft.
Prerequisite: ENAE414.
Restriction: Must be in Engineering: Aerospace program.

ENAE420 Computational Structural Mechanics (3 Credits)
Introductory of finite element methods for aerospace engineering modeling and analysis; equips students with ability to understand manuals of commercial finite element analysis software.
Prerequisite: ENES220 and MATH241; and must have completed a course in linear algebra.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE423 Vibration and Aeroelasticity (3 Credits)
Dynamic response of single and multiple degrees of freedom systems, finite element modeling, wing divergence, aileron reversal, wing and panel flutter.
Prerequisite: ENAE324.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE425 Mechanics of Composite Structures (3 Credits)
Introduction to structures composed of composite materials and their applications in aerospace. In particular, filamentary composite materials are studied. Material types and fabrication techniques, material properties, micromechanics, anisotropic elasticity, introduction to failure concepts.
Prerequisite: MATH246, ENAE324, ENES220, and MATH241.

ENAE432 Control of Aerospace Systems (3 Credits)
An introduction to the feedback control of dynamic systems. Laplace transforms and transfer function techniques; frequency response and Bode diagrams. Stability analysis via root locus and Nyquist techniques. Performance specifications in time and frequency domains, and design of compensation strategies to meet performance goals.
Prerequisite: Minimum grade of C- in ENAE301 and ENAE283.
Restriction: Junior standing or higher; and must be in Engineering: Aerospace program.

ENAE441 Space Navigation and Guidance (3 Credits)
Principles of navigation. Celestial, radio, and inertial navigation schemes. Navigational and guidance requirements for orbital, planetary, and atmospheric entry missions. Fundamentals of communications and information theory. Link budgets, antennas and telemetry systems.
Prerequisite: ENAE404 and ENAE432.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE455 Aircraft Propulsion and Power (3 Credits)
Thermodynamic cycle analysis, aerothermochemistry of fuels and propellants, operating principles of piston, turbojet, fanjet, and other variations of airbreathing aircraft power units.
Prerequisite: ENES232, ENAE414, and ENAE311.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE457 Space Propulsion and Power (3 Credits)
Thermodynamic cycle analysis, aerothermochemistry of fuels and propellants, operating principles of rocket, ion, and other exoatmospheric power units.
Prerequisite: PHYS271, ENES232, PHYS270, and ENAE311.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department. And senior standing.

ENAE464 Aerospace Engineering Laboratory (3 Credits)
Application of fundamental measuring techniques to measurements in aerospace engineering. Includes experiments in aerodynamics, structures, propulsion, flight dynamics and astrodynamics. Correlation of theory with experimental results.
Prerequisite: ENAE324, ENAE362, ENAE311, and ENAE432.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE471 Aircraft Flight Testing (3 Credits)
Provides basic instruction to aircraft flight testing and demonstrates need for systematic, well-proven technique to allow for accurate airplane performance. Concepts of aerodynamics, airplane performance, and stability and control. Emphasis on single-engine general aviation type aircraft.
Prerequisite: ENAE414.
Corequisite: ENAE403.
Restriction: Must be in Engineering: Aerospace program.

ENAE481 Principles of Aircraft Design (3 Credits)
Aircraft design principles blending both synthesis and analysis. The iterative nature of the design process. Applied aerodynamics. Elements of aircraft performance calculation and optimization. Design of aircraft including payload, crew and avionics provisions, propulsion selection and sizing, aerodynamic configuration optimization, mass properties, stability and control characteristics, and vehicle subsystems. Individual student projects in aircraft design.
Prerequisite: ENAE324, ENAE362, and ENAE432.
Corequisite: ENAE414.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE482 Aeronautical Systems Design (3 Credits)
Senior capstone design course in the aeronautics track. Introduction of computerized methods for sizing and performance analysis. More comprehensive methods to predict weight, aerodynamics and propulsion system characteristics. Consideration in design disciplines such as vulnerability, maintainability, produceability, etc. Groups of students will complete, brief and report on a major design study to specific requirements.
Prerequisite: ENAE455, ENAE423, ENAE403, and ENAE481.
Restriction: Must be in Engineering: Aerospace program; and senior standing or higher.

ENAE483 Principles of Space Systems Design (3 Credits)
Principles of space systems analysis and vehicle design. Launch vehicle performance analysis and optimization. Design of vehicle systems including avionics, power, propulsion, life support, human factors, structures, actuator and mechanisms, and thermal control. Design processes and design synthesis. Individual student projects in vehicle design.
Prerequisite: ENAE404, ENAE324, ENAE362, and ENAE432.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE484 Space Systems Design (3 Credits)
Senior capstone design course in the space track. Group preliminary design of a space system, including system and subsystem design, configuration control, costing, risk analysis, and programmatic development. Course also emphasizes written and oral engineering communications.
Prerequisite: ENAE423, ENAE483, ENAE441, and ENAE457.
Restriction: Must be in Engineering: Aerospace program.

ENAE488 Topics in Aerospace Engineering (1-4 Credits)
Technical elective taken with the permission of the student's advisor and instructor. Lecture and conference courses designed to extend the student's understanding of aerospace engineering. Current topics are emphasized.
Prerequisite: Permission of student's advisor required.
Restriction: Permission of instructor.

ENAE499 Elective Research (3 Credits)
Undergraduate research project and paper conducted under the direction of an aerospace engineering faculty member to be presented at a conference or competition.
Prerequisite: Permission from student's advisor required.
Restriction: Senior standing or higher; and must be in Engineering: Aerospace program; and permission of instructor; and permission of ENGR-Aerospace Engineering department.
Repeatable to: 6 credits if content differs.

ENAE601 Astrodynamics (3 Credits)
Mathematics and applications of orbit theory, building upon the foundations developed in ENAE 404 and ENAE 441. Topics include two body orbits, solutions of Kepler's equation, the two-point boundary value problem, rendezvous techniques, and Encke's method.
Prerequisite: ENAE404 and ENAE441.

ENAE602 Spacecraft Attitude Dynamics and Control (3 Credits)
Rigid body rotational dynamics of spacecraft; forced and unforced motion, torques produced by the orbital environment; orbit/attitude coupling; gas jet, momentum wheel, and magnetic torque actuators. Elementary feedback attitude regulators and algorithms for linear and nonlinear attitude tracking.
Prerequisite: ENAE404 and ENAE432.

ENAE603 Near-Earth Object Exploration (3 Credits)
An overview of the near-Earth objects (NEOs) of our solar system--the asteroids and comets whose orbits closely approach Earth's orbit--and what we know about them, what we're learning about them, and how to design spacecraft missions to interact with them.
Prerequisite: ENAE601.
Restriction: Must be in one of the following programs (ENGR: MS/PhD-Aerospace Engineering (Master's); ENGR: MS/PhD-Aerospace Engineering (Doctoral)).
Credit Only Granted for: ENAE788N or ENAE603.
Formerly: ENAE788N.

ENAE631 Helicopter Aerodynamics I (3 Credits)
A history of rotary-wing aircraft, introduction to hovering theory, hovering and axial flight performance, factors affecting hovering and vertical flight performance, autorotation in vertical descent, concepts of blade motion and control, aerodynamics of forward flight, forward flight performance, operational envelope, and introduction to rotor acoustics.
Prerequisite: ENAE414 and ENAE311. Or permission of ENGR-Aerospace Engineering department; and permission of instructor.

ENAE632 Helicopter Aerodynamics II (3 Credits)
Basic aerodynamic design issues associated with main rotors and tail rotors, discussion of detailed aerodynamic characteristics of rotor airfoils, modeling of rotor airfoil characteristics, review of classical methods of modeling unsteady aerodynamics, the problem of dynamic stall, review of methods of rotor analysis, physical description and modeling of rotor vortical wakes, discussion of aerodynamic interactional phenomena on rotorcraft, advanced rotor tip design, physics and modeling of rotor acoustics.
Prerequisite: ENAE631; and (ENAE414 and ENAE311; or students who have taken courses with comparable content may contact the department). Or permission of ENGR-Aerospace Engineering department.

ENAE633 Helicopter Dynamics (3 Credits)
Flap dynamics. Mathematical methods to solve rotor dynamics problems. Flap-lag-torsion dynamics and identify structural and inertial coupling terms. Overview on rotary wing unsteady aerodynamics. Basic theory of blade aeroelastic stability and ground and air resonance stability, vibration analyses and suppression.
Prerequisite: ENAE631. Or permission of ENGR-Aerospace Engineering department; and permission of instructor.

ENAE634 Helicopter Design (3 Credits)
Principles and practice of the preliminary design of helicopters and similar rotary wing aircrafts. Design trend studies, configuration selection and sizing methods, performance and handling qualities analyses, structural concepts, vibration reduction and noise. Required independent design project conforming to a standard helicopter request for proposal (RFP).
Prerequisite: ENAE631. Or permission of ENGR-Aerospace Engineering department; and permission of instructor.

ENAE635 Helicopter Stability and Control (3 Credits)
Advanced dynamics as required to model rotorcraft for flight dynamic studies. Development of helicopter simulation models and specifications of handling qualities. Methods for calculation of trim, poles, frequency response, and free flight response to pilot inputs.
Prerequisite: ENAE631.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE636 Helicopter Dynamics II (3 Credits)
Aerodynamics, dynamics and aeromechanics of helicopters and tilt rotor aircraft. Experimental testing and mathematical modeling required for the design and analysis of such aircraft.
Credit Only Granted for: ENAE788R or ENAE636.
Formerly: ENAE788R.

ENAE641 Linear System Dynamics (3 Credits)
Linear systems; state space, multi-input, multi-output models; eigenstructure; controllability, observability, singular value analysis; multivariable Nyquist condition; observer design; introduction to Kalman filtering. Full state feedback techniques including pole placement and LQR/LQG techniques; introduction to loop shaping and robustness.
Prerequisite: ENAE432.

ENAE642 Atmospheric Flight Control (3 Credits)
Exposure to flight guidance and control. Draws heavily from vehicle dynamics as well as feedback theory, and careful treatment of the non-linear aspects of the problem is critical. Conventional sythesis techniques are stressed, although modern methods are not ignored. Multivariable system analysis is included, along with flight-control design objectives and hardware limitations. Emphasis on aircraft and missiles.
Prerequisite: ENAE403 and ENAE432; or students who have taken courses with comparable content may contact the department.

ENAE646 Advanced Dynamics of Aerospace Systems (3 Credits)
Introduces the principles and methods for formulating and analyzing mathematical models of aerospace systems using Newtonian, Lagrangian, and Hamiltonian formulations of particle and rigid body dynamics. Additional topics include applied dynamical systems, geometric mechanics, and symmetry and reduction.
Prerequisite: ENAE301.
Credit Only Granted for: ENAE788G or ENAE646.
Formerly: ENAE788G.

ENAE647 Flexible Multi-body Dynamics (3 Credits)
Review of particle dynamics, rigid body kinematics, analytical dynamics, constraint equations in multibody dynamics, methods for enforcing kinematic constraint, formulation of flexible bodies in multibody dynamics, finite element modeling, and numerical integration methods.
Prerequisite: ENAE646.
Restriction: Must be in one of the following programs (ENGR: MS/PhD-Aerospace Engineering (Doctoral); ENGR: MS/PhD-Aerospace Engineering (Master's)).
Credit Only Granted for: ENAE788Q or ENAE647.
Formerly: ENAE788Q.

ENAE651 Smart Structures (3 Credits)
Topics related to the analysis, design, and implementation of smart structures and systems: modeling of beams and plates with induced strain actuation; shape memory alloys; electro-rheological fluids; magnetostrictor and electrostricter actuators and fiber optic sensors.

ENAE652 Computational Structural Mechanics (3 Credits)
Fundamentals of structural mechanics and computational modeling. Finite element modeling of two- and three-dimensional solids, plates and shells. Geometrically nonlinear behavior. Structural stability such as buckling and postbuckling.
Restriction: Permission of instructor; and permission of ENGR-Aerospace Engineering department.
Credit Only Granted for: ENME 674, ENAE652, ENPM652 or ENPM808F.

ENAE653 Nonlinear Finite Element Analysis of Continua (3 Credits)
Finite element formulation of nonlinear and time dependent processes. Introduction to tensors, nonlinear elasticity, plasticity and creep. Application to nonlinear solids including aerospace structures, such as shells undergoing finite rotations.
Prerequisite: ENAE652; or students who have taken courses with comparable content may contact the department.

ENAE654 Mechanics of Composite Structures (3 Credits)
An introduction to structures composed of composite materials and their applications in aerospace. In particular, filamentary composite materials are studied. Material types and fabrication techniques, material properties, micromechanics, anisotropic elasticity, introduction to failure concepts.

ENAE655 Structural Dynamics (3 Credits)
Advanced principles of dynamics necessary for structural analysis; solutions of eigenvalue problems for discrete and continuous elastic systems, solutions to forced response boundary value problems by direct, modal, and transform methods.

ENAE656 Aeroelasticity (3 Credits)
Topics in aeroelasticity: wing divergence; aileron reversal; flexibility effects on aircraft stability derivatives; wing, empennage and aircraft flutter; panel flutter; aircraft gust response; and aeroservoelasticity of airplanes.
Prerequisite: ENAE655.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE663 Introduction to Plasmas for Space Propulsion and Power (3 Credits)
Characteristics of plasmas, motion of charged particles in fields, collisional processes, kinetic theory, fluid desctiption of plasmas, transpot properties, equilibrium vs. non-equilibrium, generation of plasmas.
Prerequisite: PHYS411; and permission of instructor.
Credit Only Granted for: ENAE788L or ENAE663.
Formerly: ENAE788L.

ENAE665 Advanced Airbreathing Propulsion (3 Credits)
Advanced treatment of airbreathing propulsion technologies, propulsion system analysis, and engine/airframe integration. Topics will vary, but may include novel engine cycles, advanced gas turbine systems, pulsed systems, and high-speed engines, including scramjets and combined cycle systems.
Prerequisite: ENAE674 and ENAE455; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.

ENAE667 Advanced Space Propulsion and Power (3 Credits)
Advanced treatment of selected space propulsion and power technologies, methods of analysis and performance estimation. Topics will vary each year as time permits, but may include cold gas systems, chemical, nuclear, arcjets, beamed energy, and electric propulsion systems, as well as other advanced concepts.
Prerequisite: ENAE663.
Restriction: Permission of instructor.

ENAE674 Aerodynamics of Compressible Fluids (3 Credits)
One-dimensional flow of a perfect compressible fluid. Shock waves. Two-dimensional linearized theory of compressible flow. Two-dimensional transonic and hypersonic flows. Exact solutions of two-dimensional isotropic flow. Linearized theory of three-dimensional potential flow. Exact solution of axially symmetrical potential flow. One-dimensional flow with friction and heat addition.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE675 Unsteady Aerodynamics (3 Credits)
Classical theories of incompressible unsteady aerodynamics with an introduction to modeling techniques. Topics include: unsteady Bernoulli's equation, added mass, the indicial response method, dynamic stall, and modern applications.
Prerequisite: ENAE414; and permission of instructor.
Credit Only Granted for: ENAE672 or ENAE675.
Formerly: ENAE672.

ENAE676 Turbulence (3 Credits)
Physical and statistical descriptions of turbulence; review of phenomenological theories for turbulent flows; scales of motion; correlations and spectra; homogeneous turbulent flows; inhomogeneous shear flows; turbulent flows in pipes and channels; turbulent boundary layers; theory of methods for turbulent flows (Reynolds stress equations, LES, DES, DNS); experimental methods for turbulence measurements.
Prerequisite: ENAE673.
Recommended: ENAE674.

ENAE681 Engineering Optimization (3 Credits)
Methods for unconstrained and constrained minimization of functions of several variables. Sensitivity analysis for systems of algebraic equations, eigenvalue problems, and systems of ordinary differential equations. Methods for transformation of an optimization problem into a sequence of approximate problems. Optimum design sensitivity analysis.

ENAE682 Hypersonic Aerodynamics (3 Credits)
Hypersonic shock and expansion waves, Newtonian theory, Mach methods, numerical solutions to hypersonic inviscid flows, hypersonic boundary layer theory, viscous interactions, numerical solutions to hypersonic viscous flows. Applications to hypersonic vehicles.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE683 High Temperature Gas Dynamics (3 Credits)
Aspects of physical chemistry and statistical thermodynamics necessary for the analysis of high temperature flows, equilibrium and nonequilibrium chemically reacting flows, shock waves, nozzle flows, viscous chemically reacting flow, blunt body flows, chemically reacting boundary layers, elements of radiative gas dynamics and applications to hypersonic vehicles.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE684 Computational Fluid Dynamics I (3 Credits)
Partial differential equations applied to flow modelling, fundamental numerical techniques for the solution of these equations, elliptic, parabolic, and hyperbolic equations, elements of finite difference solutions, explicit and implicit techniques. Applications to fundamental flow problems.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE685 Computational Fluid Dynamics II (3 Credits)
Continuation of ENAE 684. Basic algorithms for the numerical solution of two and three dimensional inviscid and viscous flows. Applications to internal and external flow problems.
Prerequisite: ENAE684.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE688 Seminar (1-3 Credits)

ENAE691 Satellite Design (3 Credits)
Systems design of Earth-orbiting satellites, including geostationary communications satellites and low Earth orbit constellations. Basics of orbital motion, communications, and instrument design. Spacecraft systems, structural design, thermal design, power generation, and attitude determination and control. Launch vehicle interfacing and mission operations.
Prerequisite: ENAE483.

ENAE692 Introduction to Space Robotics (3 Credits)
Analysis techniques for manipulator kinematics and dynamics. DH parameters, serial and parallel manipulators, approaches to redundancy. Applications of robots to space operations, including manipulators on free-flying bases, satellite servicing, and planetary surface mobility. Sensors, actuators, and mechanism design. Command and control with humans in the loop.

ENAE694 Spacecraft Communications (3 Credits)
Brief overview of satellite orbits. Radio frequency communications, noise, and bandwidth limitations. Link budget analysis. Modulation and multiplexing approaches, multiple access systems. Satellite transponder and Earth station technology.

ENAE696 Spacecraft Thermal Design (3 Credits)
Thermal sources in space. Black-body radiation; absorptivity and emissivity; radiative thermal equilibrium. Mutually radiating plates, view angles, and interior conduction. Techniques of spacecraft thermal analysis; approaches to passive and active thermal control.

ENAE697 Space Human Factors and Life Support (3 Credits)
Engineering requirements supporting humans in space. Life support design: radiation effects and mitigation strategies; requirements for atmosphere; water, food, and temperature control. Accommodations for human productivity in space: physical and psychological requirements; work station design; and safety implication of system architectures. Design and operations for extra-vehicular activity.

ENAE741 Interplanetary Navigation and Guidance (3 Credits)
Interplanetary trajectory construction; patched and multiconic techniques. Methods of orbit and attitude determination; applied Kalman filtering. Guidance algorithms and B-plane targeting. Interplanetary navigation utilizing in situ and radio techniques.
Prerequisite: ENAE601 and ENAE432.

ENAE742 Robust Multivariable Control (3 Credits)
Limitations on achievable performance in multivariable feedback systems due to uncertainty. Singular values, matrix norms, multivariable Nyquist stability theory, uncertainty modeling in aerospace systems. Loop-shaping, generalization of Bode design principles. Characterizing the uncertainty, robustness and performance analysis, and synthesis, primarily in the frequency domain. Current research directions. Aerospace examples are used to complement the theory.
Prerequisite: ENAE641.

ENAE743 Applied Nonlinear Control of Aerospace Vehicles (3 Credits)
Modern methods of analysis and synthesis of multivariable nonlinear control techniques for aircraft, spacecraft, and space manipulator systems. Topics include passivity and Lyapunov theory, feedback linearization, nonlinear observers, Hamiltonian methods, robust controller design, and an introduction to adaptive nonlinear control methods.
Prerequisite: ENAE641.

ENAE757 Advanced Structural Dynamics (3 Credits)
Demonstrate the practical application of Smart Materials and Spatially Distributed Transducers to the design and control of advanced structures. The course will be focused toward the active control of continuum structures using advance Spatially Distributed Parameter System control techniques and concepts. Effective system parameterizations will be used to reduce distributed parameter system models to classical canonical state space form for the purpose of robust adaptive structure design. Application case studies, including morphing structures will be employed as necessary to enhance the students intuition and understanding of Distributed Parameter Systems.
Prerequisite: ENAE655; or students who have taken courses with comparable content may contact the department.

ENAE788 Selected Topics in Aerospace Engineering (1-3 Credits)

ENAE791 Launch and Entry Vehicle Design (3 Credits)
Design of aerospace vehicles for atmospheric transit to and from space. Generic formulation of atmospheric flight dynamics. Ballistic and lifting entry trajectories. Estimation of vehicle aerodynamic properties and aerothermodynamic heating. Entry thermal protection design. Trajectory analysis of sounding rockets and orbital launch vehicles. Serial, parallel, and hybrid multistaging schemes, optimal multistaging. Constrained trajectory optimization. Launch vehicle economic and reliability analysis, flight termination systems, sensors and actuators.
Prerequisite: ENAE601.

ENAE799 Master's Thesis Research (1-6 Credits)

ENAE898 Pre-Candidacy Research (1-8 Credits)

ENAE899 Doctoral Dissertation Research (1-8 Credits)

ENBE - Biological Resources Engineering

ENCE - Engineering, Civil

ENCE402 Simulation and Design of Experiments for Engineers (3 Credits)
Review of statistics and hypothesis testing, sample design and design of experiments, generation of discrete and continuous distributions and their applications. Introduction of simulation languages and simulation of discrete and continuous engineering systems. Output analysis, model validation and sensitivity and reliability analysis.
Prerequisite: ENCE302; and permission of ENGR-Civil & Environmental Engineering department.

ENCE411 Environmental Engineering Science (3 Credits)
Introduces the analytical techniques available to assess performance of engineering processes as they relate to water, soil, and air treatment and quality. The basic principles of environmental management, economics of waste treatment, by-product reutilization, and energy cycles are introduced and discussed. Alternative technologies are introduced and evaluated mostly by assessing their potential to reduce waste, minimize energy use, and promote sustainability. Students' activities include, a weekly lab to provide hands-on experience with environmental quality measurements and treatment techniques; on-site visits to regional industries that undertake sustainable practices; and a final research project where experimental design and laboratory techniques are used to assess interactions between technologies and natural systems and their potential for reducing environmental impacts.
Prerequisite: ENCE310; and permission of ENGR-Civil & Environmental Engineering department.

ENCE412 Environmental Engineering Unit Operations (3 Credits)
Examination of unit operations and processes encountered in environmental engineering field. Fundamental principles learned from previous classes will be applied into the design and operation of unit operations and processes, particularly in the area of water and wastewater treatment. Similar processes will be applied to air pollution control, solid waste disposal and hazardous waste treatment.
Prerequisite: ENCE305 and ENCE310; and permission of ENGR-Civil & Environmental Engineering department.

ENCE420 Selection and Utilization of Construction Equipment (3 Credits)
Learn to evaluate and select construction equipment with a focus on mechanized equipment for earthwork and building construction.Learn about the parties involved in procurement, operation and maintenance, and how to cost-effectively plan, select, and utilize equipment for earthmoving, paving, formwork, trenching, rock excavation, tunneling, site preparation, and steel and concrete construction. Explore trends in equipment design, construction automation, and robotics.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management minor.

ENCE421 Legal Aspects of Architectural and Engineering Practice (3 Credits)
Learn the basic structure of the US legal system and court procedures and legal principles relevant to architectural and engineering design and construction contracts including principles of ethical, legal and professional conduct of engineers and architects.Topics include: contracts for design and construction, sales and warranties, torts and product liability, business agency and government agencies, professional liability of architects and engineers, labor laws, expert testimony, mediation and arbitration, tangible property including real estate, intellectual property including trademarks, patents and copyrights, insurance and sureties.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management minor; or must be in the Project Management Minor. And permission of ENGR-Civil & Environmental Engineering department.

ENCE422 Project Cost Accounting and Economics (3 Credits)
Learn: the fundamentals of accounting; project cost accounting principles as they apply to project management; project cost accounting; and the fundamentals of engineering economics.Topics include: project feasibility analysis; reading and analyzing financial statements; cash management; cash flow analysis; depreciation and taxes; and impact on profitability; the principles of activity based costing; net present value analysis; the framework for project performance measurement, cost performance indices, and earned value analysis.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management Minor; or must be in the Project Management Minor.

ENCE423 Project Planning, Estimating & Scheduling (3 Credits)
Learn the fundamentals of project planning, estimating, and scheduling. Understand the concepts of planning; to reduce uncertainty, improve efficiency of the operation, to set and meet objectives, and to provide a basis for monitoring and controlling the work. Be introduced to: the concepts of resource definition, assignment and management, and; the basics of project estimating (pricing) methods including global pricing strategies, types of estimates, pricing processes, overhead and profit, and project financing.Learn the basics of project scheduling including; bar charts, network-based methodologies, and linear scheduling techniques. Emphasis is placed on Critical Path Method (CPM) scheduling, a network based methodology. Be exposed to the use of scheduling software and will actually develop a CPM schedule for an actual construction project as part of a semester project.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management Minor; or must be in the Project Management Minor. And permission of ENGR-Civil & Environmental Engineering department.

ENCE424 Communication for Project Managers (3 Credits)
Learn the fundamentals of communications for project managers. Emphasis is on interpersonal and group communications; through voice, electronic, and written messages; project cycle and reports and presentations during this cycle; and communications for employment.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management Minor; or must be in the Project Management Minor.

ENCE426 Construction Documentation and BIM Applications in Engineering and Construction (3 Credits)
Learn the basics of construction documentation methods, with particular emphasis on Building Information Modeling (BIM). Topics include: the fundamentals of assembly, coordination, and maintenance of construction documents and implementation of BIM techniques in the design and construction processes, and; a review of Autodesk, Revit, and Navisworks and other leading BIM software. Lectures from project management faculty supplemented by guest lecturers from the construction industry.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management Minor; or must be in the Project Management Minor.

ENCE431 Hydrologic Engineering (3 Credits)
An introduction to basic principles of hydrologic science including the hydrologic cycle, rainfall, surface runoff and streamflow. Special emphasis is placed on hydrologic engineering design of stormwater management and flood control facilities. Design projects are used to illustrate design practices.
Prerequisite: ENCE305; and permission of ENGR-Civil & Environmental Engineering department.

ENCE432 Ground Water Hydrology (3 Credits)
Concepts related to the development of the ground water resources, hydrology, hydrodynamics of flow through porous media, hydraulics of wells and basin-wide ground water development. Fundamentals of ground water pollution are introduced.
Prerequisite: ENCE305; and permission of ENGR-Civil & Environmental Engineering department.

ENCE441 Foundation Design (3 Credits)
Critical review of classical lateral earth pressure theories, analysis of retaining walls and reinforced earth walls, subsurface explorations, bearing capacity and settlement of shallow foundations, design of deep foundations that includes both pile foundations and drilled shafts.
Prerequisite: ENCE340; and permission of ENGR-Civil & Environmental Engineering department.

ENCE444 Experimental Methods in Geotechnical Structural Engineering (3 Credits)
In the geotechnical engineering part of the course, major soils testing and their interpretation including classification, compaction, strength, and compressibility will be undertaken. The structural engineering part of this course covers test planning, loading apparatus, instrumentation, data acquisition and data analysis, as well as basic aspects of structural testing techniques and shake-table test.
Prerequisite: ENCE353 and ENCE340; and permission of ENGR-Civil & Environmental Engineering department.

ENCE447 Pavement Engineering (3 Credits)
Fundamental principles underlying the design, construction, maintenance and repair, and management of highway and airfield pavement systems. Pavement performance (functional/structural; evaluation); pavement mechanics (multi-layered elastic theory; slab theory); pavement materials (properties and characterization); environmental effects; current rigid and flexible design methods (new/rehabilitation); construction (new construction; maintenance/repair; rehabilitation); economic evaluation; pavement management.
Prerequisite: ENCE340; and permission of ENGR-Civil & Environmental Engineering department.

ENCE453 Computer-Aided Structural Analysis (3 Credits)
Computer-aided analysis of structural systems. Unified matrix formulation of stiffness and flexibility methods. Slope deflection method. Evaluation of truss, frame, and grid systems. Non-prismatic and curved elements. Error analysis and determination of ill-conditions. Introduction to finite element methods; formulation of simple two-dimensional elements. In laboratory, use and development of CAD software.
Prerequisite: ENCE353; and permission of ENGR-Civil & Environmental Engineering department.

ENCE454 Design of Concrete Structures (3 Credits)
Combined bending and compression, development and anchorage of reinforcement, deflections, design of slabs including one-way and two-way, design of footings, retaining walls, introduction to prestressed concrete, design of multi-story buildings.
Prerequisite: ENCE353; and permission of ENGR-Civil & Environmental Engineering department.
Formerly: ENCE451.

ENCE455 Design of Steel Structures (3 Credits)
Behavior and design of members subjected to fatigue, and combined bending and compression; plate girders, composite beams, open-web joists and connections. Methods of allowable stress design, and load and resistance factor design. Elements of plastic analysis and design. Framing systems and loads for industrial buildings and bridges.
Prerequisite: ENCE353; and permission of ENGR-Civil & Environmental Engineering department.

ENCE466 Design of Civil Engineering Systems (3 Credits)
A major civil engineering design experience that emphasizes development of student creativity, development and use of design methodologies, evaluation of alternate solutions, feasibility considerations, and detailed system descriptions. Realistic design constraints including economic factors, safety, aesthetics, and reliability will be imposed. Students will work in design project groups and be required to exercise oral and written communication skills.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Senior standing.
Additional Information: Must be taken in the semester in which the student graduates.

ENCE470 Highway Engineering (3 Credits)
Highway location and design, highway engineering economics, traffic engineering, traffic measurement devices and technologies. Includes discussion of technological advances in traffic flow and capacity, such as signal systems, corridor control, automatic driver information, incident detection and autonomous vehicle operation.
Prerequisite: ENCE302 and ENCE370; and permission of ENGR-Civil & Environmental Engineering department.

ENCE472 Transportation Engineering (3 Credits)
Transportation engineering concepts including transportation systems analysis, airport systems, airline and airport operations, marine transportation and urban public transportation systems.
Prerequisite: ENCE302 and ENCE370; and permission of ENGR-Civil & Environmental Engineering department.

ENCE488 Senior Thesis (3 Credits)
Advanced study in civil engineering problems with special emphasis on mathematical modeling and experimental methods.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Senior standing.

ENCE489 Special Problems in Civil Engineering (1-4 Credits)
A course arranged to meet the needs of exceptionally well prepared students for study in a particular field of civil engineering.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Senior standing.

ENCE600 The Project Management Office: Execution Across Boundaries (3 Credits)
This course begins with a review of the project's cultural environment in order to understand the context of executing projects globally. Emphasis will be on the project office's role in stakeholders' engagement in the planning and execution aspects of projects. The coursewill also highlight the role of the project office in the virtual and agile management of project delivery; the fundamentals of communicating across different cultural boundaries; and the importance of matrixed business alliances.
Prerequisite: ENCE662.
Restriction: Must be in one of the following programs (ENGR: MS/PhD-Civil Engineering (Master's); ENGR: MS/PhD-Civil Engineering (Doctoral); Master of Engineering (Master's)) ; or permission of ENGR-Civil & Environmental Engineering department.

ENCE601 Program and Portfolio Management (3 Credits)
A view of managing projects from an organizational perspective will be presented. The principle areas of discussion will be strategic alignment, marshalling organizational assets through an enterprise project office, portfolio management, and program management. Using a case study approach, students will explore the importance of using organizational strategies to align projects, how to use an enterprise project office as a governance process, and apply practices to create portfolios and programs to leverage organizational assets. Principle topics will include establishing a governance process, project selection techniques, project portfolio methodology, and application of project practices to program management.
Restriction: Must be in one of the following programs (ENGR: MS/PhD-Civil Engineering (Master's); Master of Engineering-Project Mgmt (Master's); ENGR: MS/PhD-Civil Engineering (Doctoral); Master of Engineering (Master's)) ; or permission of ENGR-Civil & Environmental Engineering department.
Credit Only Granted for: ENCE601 or ENCE688F.
Formerly: ENCE688F.

ENCE602 Project Procurement Management (3 Credits)
Fundamental concepts and techniques for project acquisition and procurement are presented. Students are introduced to the PMBOK Guide six-step procurement process and expected to develop an in-depth understanding of project evaluation, planning, financing, contracting, negotiation, and procurement execution. It will also cover emerging methods, principles, and practices in infrastructure project procurement, including Public-Private Partnerships, Carbon project procurement, and Clean Development Mechanism.

ENCE603 Management Science Applications in Engineering (3 Credits)
The fundamentals of Management Science techniques in Project Management including: linear and integer programming, goal programming, multi-objective optimization, simulation, Analytic Hierarchy Process (AHP), deterministic and stochastic dynamic programming will be covered. Applications will be drawn from the Critical Path Method (CPM), resource management, and other areas of Project management.
Prerequisite: (ENCE302; or (ENME271 and ENME392)); and (MATH140 and MATH240). Or permission of instructor. Also offered as: ENCE603.
Credit Only Granted for: ENME738, ENME741, or ENCE603.
Formerly: ENME738.

ENCE604 Sustainabilty Fundamentals for Project Managers (3 Credits)
Addresses the fundamentals of sustainability for project managers including best practices of modern sustainable construction and project management. Commercial and residential buildings consume about 40 percent of the energy used in the United States. Therefore, emphasis will be on the application of the sustainable development standards to the built environment, including the practical operational aspects of sustainable facility project management.

ENCE605 Evolving as a Project leader (3 Credits)
Projects are now used by many organizations for the implementation of strategic initiatives. This means that project managers must be able to do more than manage, organize, and control. They must be able to lead the project team and its stakeholders through change. This course builds on the foundation created in ENCE665. It explores: (1)leadership theory and evolution; (2) the role of leadership in project teams; (3) you as a leader; and (4) your personal development as a project leader.
Prerequisite: ENCE665.

ENCE606 Graduate Introduction to Project Scheduling (3 Credits)
Students are taught the basics of project scheduling and the various scheduling approaches that are currently being used in the design and construction industry. Project planning techniques will be covered and basic scheduling methods will be taught including the use of bar charts. Critical Path Method (CPM), Program Evaluation and Review (PERT) and Linear Scheduling (Line of Balance) methods.

ENCE607 Mastering Agile Project Management (3 Credits)
Learn how and why Agile project management is the fastest growing and most successful project management philosophy today. Learn the mechanics of how to design and facilitate projects using pure Agile Scrum and Lean Kanban techniques; The tradeoffs of using hybrid techniques such as Lean Startup, Scaled Agile for the Enterprise, and Disciplined Agile Development. Then go beyond these frameworks to the science beneath with the essential principles to ensure you get the best benefits of Agile project management methods.
Prerequisite: Must have completed or be concurrently enrolled in ENCE662.
Restriction: Must be in one of the following programs: MS in Civil Engineering, Master of Engineering in Project Management, or Post-Baccalaureate Certificate in Engineering in Project Management; or must have permission of the department.

ENCE610 Fundamentals of Structural Analysis (3 Credits)
Cartesian tensor notation. Linear forms of the general equilibrium, compatability, and constitutive equations. The calculus of variations. The principles of virtual work and complementary virtual work. Self-adjoint problem formulations.

ENCE611 Finite Element Methods (3 Credits)
Basic principles and fundamental concepts of the finite element method. Consideration of geometric and material nonlinearities, convergence, mesh gradation and computational procedures in analysis. Applications to plane stress and plane strain, plates and shells, eigenvalue problems, axisymmetric stress analysis, and other problems in civil engineering.
Formerly: ENCE661.

ENCE613 Structural Dynamics (3 Credits)
Analysis of the dynamic response of structrues and structural components subjected to impact load, transient load, and ground excitations; study of single degree-of-freedom and multi degree-of-freedom systems in classical closed form solution and approximate numerical solution; solution in the frequency domain and the use of finite element method.
Formerly: ENCE653.

ENCE620 Risk Analysis for Engineering (3 Credits)
Sources of hazards, definition of risk, system analysis, functional modeling and analysis techniques, probabilistic risk assessment procedure, risk methods, risk acceptance, assessment of failure likelihood, consequence assessment, risk benefit assessment, uncertainty surces and types, modeling uncertainty, risk analysis and decision making under uncertainty, collection of data, expert-opinion elicitation, human-machine interface and human factors engineering.

ENCE621 Uncertainty Modeling and Analysis (3 Credits)
Definition of engineering systems, knowledge levels using information science concepts as applied to engineering systems, sources and types of knowledge and ignorance, uncertainty sources and types for engineering systems, probability models, statistical models, fuzziness, fuzzy sets, fuzzy logic, fuzzy arithmetic, imprecise probabilities, evidence methods, uncertainty measures, uncertainty management, uncertainty reduction, applications of these analytical methods to engineering systems and in decision making.
Prerequisite: ENCE302; or students who have taken courses with comparable content may contact the department.

ENCE622 Construction Automation & Robotics (3 Credits)
Covers advanced technologies leading to redesign and partial or full automation of selected construction processes utilizing industrial robotics. Lectures and presentations will cover topics such as basic robotic technology (robot kinematics and dynamics, industrial manipulators, mobility bases, end effectors, sensors, control systems, and robot task programming), design of automated construction processes, selection of means and methods for automated construction processes, robot ergonomics and safety, calculation of costs and benefits of construction robots in selected applications, engineering and economic feasibility of automation and robotics in the construction industry.
Restriction: Must be in Engineering: Civil program; or permission of ENGR-Civil & Environmental Engineering department.

ENCE623 Introduction to Advanced Scheduling (3 Credits)
A Combination of lecture and hands-on use of software to develop advanced knowledge and skills necessary to master advanced scheduling techniques for project management and control will be used. No software purchase is necessary.
Prerequisite: ENCE423 or ENCE662; and permission of ENGR-Civil & Environmental Engineering department.
Credit Only Granted for: ENCE623 or ENCE688S.

ENCE624 Managing Projects in a Dynamic Environment (3 Credits)
This course examines the nine principles simultaneous managers use interdependently and presents a theory of project management that is intellectually rigorous and consistent with pragmatic knowledge.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.

ENCE625 Project Administration (3 Credits)
The principles of project administration procedures from the viewpoint of a resident project manager or project engineer specifically addressing their responsibilities in the engineering, design, or construction industries are examined. The course is suitable for students, engineering and design professionals, project managers, experienced contract administrators, and owners interested in the special administrative problems of construction.

ENCE626 Information Technologies for Project Managers (3 Credits)
Introduction to various information technology (IT) and automation-based solutions for project managers in capital project industries, including IT and automation tools for major life-cycle stages of a project: planning, design, fabrication/construction, operation, maintenance, retrofit and demolition/recycling. Both established and experimental approaches and tools will be covered. Building/Product Information Modeling software, sensing devices, field data acquisition and processing for project controls, status reporting, materials and equipment management, environmental monitoring, work-site safety and facility operations and management will be presented and analyzed. Web-based project management software solutions and applications for mobile devices such as tablets and smart phones will be featured in classroom presentations and materials provided to the students. Real project case studies from project-based firms will be used to illustrate the feasibility and usability of the tools presented in class. Students will be expected to acquire hands-on knowledge and experience with selected tools of particular interest in support of their future career paths.
Prerequisite: ENCE662.

ENCE627 Project Risk Management (3 Credits)
Introduction to identifying, analyzing, assessing, and managing risks inherent to engineering projects. Includes: probability modeling, choice and value theory, schedule and cost risk, risk mitigation and transfer, and contract considerations of project risk. Examples are drawn from construction, software development, systems integration, and other large engineering projects; and cover probability basics, subjective probability, statistical data analysis, introduction to decision theory, Monte Carlo simulation, value of information, and risk-based decision making.
Restriction: Must not have completed ENCE627.

ENCE630 Environmental and Water Resource Systems I (3 Credits)
Application of statistical and systems engineering techniques in the analysis of information necessary for the design or characterization of environmental or hydrologic processes; emphasis on the fundamental considerations that control the design of information collection programs, data interpretation, and the evolution of simulation models used to support the decision-making process.

ENCE631 Hydrologic Analysis and Nonpoint Pollution Models (3 Credits)
A detailed analysis of the physical processes controlling the spatial distribution of runoff and constituent transport during rainfall and snowmelt events. Emphasis is on developing an understanding of the processes and translating this understanding into practical models that can be used for runoff simulation, stormwater management, and environmental impact assessment.

ENCE635 Geographic Information Systems for Watershed Analysis (3 Credits)
Emphasis is on the use of GIS to support the analysis and modeling tasks associated with watershed planning and management. This course familiarizes the student with fundamentals of GIS data models, projections, and coordinate systems. Students develop a set of GIS-based alogrithms solving common engineering problems in hydrology. Internet data sources and GPS technology are also covered.
Credit Only Granted for: ENCE524 or ENCE688Z.
Formerly: ENCE688Z.

ENCE637 Biological Principles of Environmental Engineering (3 Credits)
An examination of biological principles directly affecting man and his environment, with particular emphasis on microbiological interactions in environmental engineering related to air, water and land systems; microbiology and biochemistry of aerobic and anaerobic treatment processes for aqueous wastes.

ENCE640 Advanced Soil Mechanics (3 Credits)
Introduction to the use of elastic theory in stress and displacement solutions to geotechnical engineering (soil and rock mechanics). The effect of soil moisture (at rest) relative to effective stress principles, capillary and frost. Exact and numeric techniques for the analysis for soil seepage under isotropic and anisotropic conditions. Classical settlement (consolidation) and compressiblility theories, including finite difference solution for vertical and radial drainage.
Prerequisite: ENCE340; or students who have taken courses with comparable content may contact the department.

ENCE641 Advanced Foundations Systems (3 Credits)
Review of soil properties and subsurface exploration, evaluation and design of shallow foundations, including settlement and bearing capacity of spread footings and mats. Discussion of methods of soil improvement. Analysis and design of deep foundations including single pile, pile load testing, pile group actions, and drilled shaft foundations for both vertical and horizontal loads. Load and resistance factor design concepts will be presented.
Prerequisite: ENCE340; or students who have taken courses with comparable content may contact the department.

ENCE644 Advanced Pavement and Civil Engineering Materials (3 Credits)
Advanced course in Highway and Civil Engineering Materials. Dynamic Material Characterization. Elastic, Plastic and Viscoelastic Behavior. Energy Analysis. Physical and Mechanical Properties. NDT. Performance: Creep, Fatigue, Durability, other. Recent developments in Aggregate Evaluation, Portland Cement Concrete, High Performance Concrete, Conventional and Modified Asphalt Binders and Mixtures, Polymers & Composites, Geotextiles, Smart and Self Healing Materials, Recycled and Reclaimed Materials.
Prerequisite: ENCE300.
Credit Only Granted for: ENCE644 or ENCE688P.
Formerly: ENCE688P.

ENCE645 Geotechnics of Waste Disposal (3 Credits)
Fundamental aspects of geotechnical engineering that apply to problems of waste containment and remediation, basic principles of containment systems, compacted clay liners and clay mineralogy, hydraulic conductivity of compacted soils, methods of laboratory and field hydraulic conductivity measurements, design of waste containment systems, landfill stability and settlement, geosynthetic liners, waste compatibility, contaminant transport through liners, leachate collection systems, gas collection systems, covers and caps.
Credit Only Granted for: ENCE489X, ENCE645, or ENCE688X.
Formerly: ENCE688X.

ENCE647 Slope Stability and Seepage (3 Credits)
Theoretical and practical aspects of seepage effects, and groundwater flow, review of shear strength principles, flow through porous media, hydraulic conductivity, flow nets, determination of water pressure, seepage forces and quantity of seepage, laboratory and field tests for shear strength, infinite slopes, block analysis, method of slices, seismic analysis of slopes, effective and total stress analysis, computer program for slope stability analysis, slope stability problems in waste disposal, construction excavations, reinforced embankments, embankments on soft ground.
Prerequisite: ENCE340.
Credit Only Granted for: ENCE489A, ENCE647, or ENCE688A.
Formerly: ENCE688A.

ENCE650 Process Dynamics in Environmental Systems (3 Credits)
The fundamentals of heterogeneous equilibria, rates of environmental reactions, and flow and material transport or presented. Applications of these principles will be presented to small and large scale environmental problems involving liquid, gas, and solid phases. Both natural and engineered environmental systems will be examined.
Formerly: ENCE636.

ENCE651 Chemistry of Natural Waters (3 Credits)
Application of principles from chemical thermodynamics and kinetics to the study and interpretation of the chemical composition of natural waters is rationalized by considering metal ion solubility controls, pH, carbonate equilibria, adsorption reactions, redox reactions and the kinetics of oxygenation reactions which occur in natural water environments.
Credit Only Granted for: ENCE633 or ENCE651.
Formerly: ENCE633.

ENCE652 Microbiological Principles of Environmental Engineering (3 Credits)
An examination of microbiological principles directly affecting humans and the surrounding environment. Special emphasis is given to the understanding of microbial physiology and in environmental engineering related to water and land systems including aerobic and anaerobic treatment processes involved in nutrient/waste recycling as well as impact of xenobiotic compounds on processes water, soil and sediment.
Credit Only Granted for: ENCE637 or ENCE652.
Formerly: ENCE637.

ENCE655 Environmental Behavior of Organic Pollutants (3 Credits)
Introduction to the scientific data needed and methods currently available to assess the environmental risk of organic chemicals. Applications of principles from chemical thermodynamics will be used to study phase-transfer processes of organic pollutants in the environment (solid/water, solid/air, water/air). Physical-chemical properties of organic pollutants will be used to estimate partitioning.
Prerequisite: ENCE651.

ENCE660 Principles of Disaster Management (3 Credits)
Covers the complexities and unique requirements that arise in preparing for, responding to, recovering from and mitigating against natural disasters. It focuses on what the Manager should know to handle pre- and post-disaster projects. The course introduces underlying policies, programs and emergency management protocols related to managing natural disasters. It translates the lexicons of emergency management to align with project management tools and processes. The course also explores the challenges of executing and delivering projects and programs during each phase of the emergency management cycle. The student will learn to build disaster-resilient concepts and emergency management into project management processes and be better equipped to contribute to a more sustainable and disaster-resilience future.

ENCE661 Project Cost Accounting and Finance (3 Credits)
This course reviews the fundamentals of accounting; examines project cost accounting principles, applications, and impact on profitability; examines the principles of activity based costing; covers the elements involved in cash management; introduces the framework for how projects are financed and the potential impact financing has on the projects; and a framework for evaluating PC based systems and what resources are needed for an effective project cost system.

ENCE662 Introduction to Project Management (3 Credits)
Introduction to project management including: overview and concepts of project management (principles, body of knowledge, strategies); planning successful projects (defining, specifying, delivery options, scheduling, budgeting); implementing (organizing the team, work assignments, team building, effective leadership); executing (performance measurement, maintaining the schedule, adjustments/mid-course corrections, record keeping, status reporting, communications, managing conflict, time management); and closeout(performance measurement, maintaining the schedule, adjustments/mid-course corrections, record keeping, status reporting, communications, managing conflict, time management).

ENCE663 Management of Design and Construction Organizations (3 Credits)
This course examines the management focus of the design and/or construction company and how corporate management is different from, yet relates to, and impacts project management. The company creates the framework within which projects may consistently achieve excellent performance or they may struggle to complete behind schedule, over budget, and not meet the customer's requirements. What makes the difference?
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.

ENCE664 Legal Aspects of Engineering Design and Construction (3 Credits)
Examines ways in which the legal system affects the design and construction process. Focuses on contract types and the relationships between the parties in different delivery systems. Covers basics of procurement protocols along with negotiating techniques and strategies. Topics include contract law, the relationships between the parties, tort and negligence law, and the statutory principles affecting construction.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.

ENCE665 Management of Project Teams (3 Credits)
Experience has shown that really excellent project managers are not only technically competent but that they have above average skills in human relations and communications. The course will prepare project managers to optimize the utilization of their most important resource: people. Relying primarily on a wide range of research and experience in the Project Team, this course will help guide project managers in building the other skills needed to be truly successful in the competitive Project Team.

ENCE666 Cost Engineering and Control (3 Credits)
Analytic techniques to estimate and control project costs, including site investigation, quantity takeoff, work analysis and bid preparation. Systematic cost control as related to job production and historical data.

ENCE667 Project Performance Measurement (3 Credits)
Examination of various techniques and models used to measure the performance of projects. Topics will include: Critical Path Method (CPM), Program Evaluation Review Technique (PERT), Gantt charts, project crashing, resource management, capital allocation, forecasting, hypothesis testing, regression analysis, learning curve analysis, goal programming, Monte Carlo simulation, the Analytic Hierarchy Process (AHP), Pareto optimality and tradeoff curves as well as basics in linear programming and uncertainity modeling.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.

ENCE670 Highway Traffic Characteristics and Measurements (3 Credits)
The study of the fundamental traits and behavior patterns of road users and their vehicles in traffic. The basic characteristics of the pedestrian, the driver, the vehicle, traffic volume and speed, stream flow and intersection operation, parking, and accidents.
Prerequisite: ENCE470; or permission of instructor.

ENCE672 Regional Transportation Planning (3 Credits)
Factors involved and the components of the process for planning statewide and regional transportation systems, encompassing all modes. Transportation planning studies, statewide traffic models, investment models, programming and scheduling.

ENCE673 Urban Transportation (3 Credits)
The contempory methodology of urban transportation planning. The urban transportation planning process, interdependence between the urban transportation system and the activity system, urban travel demand models, evaluation of urban transportation alternatives and their implementation.

ENCE674 Urban Transit Planning and Rail Transportation Engineering (3 Credits)
Basic engineering components of conventional and high speed railroads and of air cushion and other high speed new technology. The study of urban rail and bus transit. The characteristics of the vehicle, the supporting way, and the terminal requirements will be evaluated with respect to system performance, capacity, cost, and level of service.

ENCE675 Airport Planning and Design (3 Credits)
The planning and design of airports including site selection, runway configuration, geometric and structural design of the landing area, and terminal facilities. Methods of financing airports, estimates of aeronautical demand, air traffic control, and airport lighting are also studied.

ENCE676 Highway Traffic Flow Theory (3 Credits)
An examination of physical and statistical laws that are used to represent traffic flow phenomena. Deterministic models including heat flow, fluid flow, and energy-momentum analogies, car following models, and acceleration noise. Stochastic approaches using independent and Markov processes, Queuing models, and probability distributions.

ENCE677 OR Models for Transportation Systems Analysis (3 Credits)
Fundamental skills and concepts of the quantitative techniques of operations research including: mathematical modeling, linear programming, integer programming, network optimization (shortest paths, minimum spanning trees, minimum cost network flows, maximum flows), heuristics, and basics of probabilistic modeling. Emphasis on the application of these techniques to problems arising in transportation.

ENCE681 Freight Transportation Analysis (3 Credits)
Application of operations research and system analysis methods to freight transportation systems. Cost and output analysis, terminal location, freight transportation demand models, freight transportation network equilibrium models and analytic models for analyzing the operations of rail, motor carrier, water carrier and air cargo systems.

ENCE688 Advanced Topics in Civil Engineering (1-3 Credits)
Advanced topics selected by the faculty from the current literature of civil engineering to suit the needs and background of students. May be taken for repeated credit when identified by topic title.

ENCE689 Seminar (1-16 Credits)

ENCE710 Steel Structures I (3 Credits)
Moment connections of beams and columns. Wind bracing connections. Plate girders. Floor systems for buildings. Strengthening of beams and trusses. Corrosion control. Fatigue and fracture.
Formerly: ENCE656.

ENCE713 Concrete Structures I (3 Credits)
The behavior and strength of reinforced concrete members under combined loadings, including the effects of creep, shrinkage and temperature. Mechanisms of shear resistance and design procedures for bond, shear and diagonal tension. Elastic and ultimate strength analysis and design of slabs. Columns in multistory frames. Applications to reinforced concrete structures.
Formerly: ENCE753.

ENCE715 Earthquake Engineering (3 Credits)
Review of SDOF and MDOF structural dynamics; characteristics of earthquakes; philosophies of seismic design; elastic and inelastic response spectra; design for ductility; principles of capacity design; design of structural systems requiring special performance criteria.
Restriction: Permission of instructor.
Formerly: ENCE755.

ENCE717 Bridge Structures (3 Credits)
The design and rating of bridge structures in accordance with the AASHTO WSD, LFD, ALFD, and LRFD specifications. Development of the basic strength and performance requirements as defined within AASHTO, area and various foreign codes. Projects requiring the design, rating and ultimate strength evaluations will be assigned for all of the predominate construction types including: simple and continuous span, straight and horizontally curved, non-composite and composite w and box section superstructure elements.
Formerly: ENCE751.

ENCE718 Advanced Structural Systems (3 Credits)
Review of classical determinate and indeterminate analysis technique; multistory buildings; space structures; suspension bridges and cables structures; arches; long span bridges.
Formerly: ENCE750.

ENCE721 Investment Theory for Project Engineers (3 Credits)
An introductory course covering investment theory and its application to project evaluation and selection. Selected topics include: basic theory of interest and fixed income securities; portfolio selection and modification; capital asset pricing; asset price dynamics; derivative securities; and project evaluation using real options.
Credit Only Granted for: ENCE652 or ENCE721.
Formerly: ENCE652.

ENCE722 Market, Spatial, and Traffic Equilibrium Models in Project Management (3 Credits)
Introduction to equilibrium models involving economics and engineering. Topics include: review of relevent optimization theory; the nonlinear complementary problem (NCP) and variational inequality problem formats to solve equilibrium problems; review of relevant game theory, equilibrium models, and algorithims.
Credit Only Granted for: ENCE654, ENCE688M, or ENCE722.
Formerly: ENCE654.

ENCE725 Probabilistic Optimization (3 Credits)
Provide an introduction to optimization under uncertainty. Chance-constrained programming, reliability programming, value of information, two stage problems with recourse, decomposition methods, nonlinear and linear programming theory, probability theory. The objectives of this course are to provide understanding for studying problems that involve optimization under uncertainty, learn about various stochastic programming formulations (chance constrained programs, two stage methods with recourse, etc.) relevant to engineering and economic settings, present theory for solutions to such problems, and present algorithms to solve these problems.Also offered as: ENME725.
Credit Only Granted for: ENME725 or ENCE725.

ENCE730 Environmental and Water Resource Systems II (3 Credits)
Advanced topics in operational research. Applications to complex environmental and water resource systems. The use of systems simulation and probabalistic modeling.
Prerequisite: ENCE630; or permission of instructor.

ENCE740 Computational Geomechanics (3 Credits)
Focus on the application of computational mechanics, and in particular the finite element method, on the solution of stress and flow problems in geomechanics. Review of theoretical formulation of the finite element method, with particular emphasis on the special features most useful in geomechanics. Thorough treatment of the issues involved in performing robust practical analyses of real-world problems. Course term project enables students to apply these techniques to a geomechanics problem of their choosing.
Recommended: Must have previous coursework on finite element theory (e.g. ENCE611).
Credit Only Granted for: ENCE688X or ENCE740.
Formerly: ENCE688X.

ENCE741 Earth Retaining Structures (3 Credits)
Introduction to types and uses of earth retaining structures, and lateral earth pressure concepts and theories. Analysis and design of retaining walls and shoring structures and their bracing systems. These include conventional retaining walls, mechanically stabilized earth walls, cantilever and anchored sheet piling, cellular cofferdams, braced cuts, soil nailing, and the design of tiebacks and anchors. Load and resistance factor design concept will be presented.

ENCE743 Soil Dynamics and Earthquake Engineering (3 Credits)
Review of theory of vibration and wave propagation in elastic media. Field and laboratory methods for determining dynamic soil properties. Analysis and design of soil-foundation systems subjected to machinery generated vibrations and methods of foundation isolation. Earthquake causes, magnitude and intensity, seismic hazard evaluation, NEHRP site classification, site response analyses and ground motion amplification, liquefaction and response of earth structures.
Credit Only Granted for: ENCE642 or ENCE743.
Formerly: ENCE642.

ENCE744 QA/QC and Specification for Highway Materials (3 Credits)
Factorial Experiments and Analysis. Materials Variability Components: Inherent and Testing Variability. Quality Control/Quality Assurance: Analysis Methods, Assurance Plans and Components. Specifications for Asphalt and Concrete Materials: Method, End-Result, Performance Based. Life Cycle Analysis and Performance Modeling Techniques. Use of Advanced Statistical Analysis for Material Properties Monitoring and Performance Predictions: ANOVA, Time Series, Spatial Data Analysis. Advanced Highway Materials including Polymer Modified and High Performance Asphalt and Concrete.
Prerequisite: ENCE300.

ENCE751 Chemistry of Natural Waters II (3 Credits)
A continuation of ENCE651, introducing aquatic chemical kinetics and chemistry of the solid-water interface.
Prerequisite: ENCE650 and ENCE651.

ENCE755 Transformations of Organic Compounds in the Environment (3 Credits)
Focuses on reaction kinetics and mechanisms of organic pollutants transformations. Kinetic principles will be used to calculate or estimate the pollutants' half-lives. Physical-chemical properties of organic pollutants will be used to estimate transformation mechanisms and rates. Emphasis is on developing an understanding of how physico-chemical and structural properties relate with the transformations of organic pollutants.
Restriction: Permission of instructor.

ENCE799 Master's Thesis Research (1-6 Credits)

ENCE898 Pre-Candidacy Research (1-8 Credits)

ENCE899 Doctoral Dissertation Research (1-8 Credits)

ENCH - Engineering, Chemical

ENCH609 Graduate Seminar (1 Credit)

ENCH610 Chemical Engineering Thermodynamics (3 Credits)
Advanced application of the general thermodynamic methods to chemical engineering problems. First and second law consequences; estimation and correlation of thermodynamic properties; phase and chemical reaction equilibria.
Prerequisite: CHBE301; and CHBE302. Or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.

ENCH620 Methods of Engineering Analysis (3 Credits)
Application of selected mathematical techniques to the analysis and solution of engineering problems; included are the applications of matrices, vectors, tensors, differential equations, integral transforms, and probability methods to such problems as unsteady heat transfer, transient phenomena in mass transfer operations, stagewise processes, chemical reactors, process control, and nuclear reactor physics.
Prerequisite: MATH246; and CHBE250. Or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.

ENCH630 Transport Phenomena (3 Credits)
Heat, mass and momentum transfer theory from the viewpoint of the basic transport equations. Steady and unsteady state; laminar and turbulent flow; boundary layer theory, mechanics of turbulent transport; with specific application to complex chemical engineering situations.
Prerequisite: CHBE422; and ENCH424. Or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.

ENCH640 Advanced Chemical Reaction Kinetics (3 Credits)
The theory and application of chemical reaction kinetics to reactor design. Reaction rate theory; homogeneous batch and flow reactors; fundamentals of catalysis; design of heterogeneous flow reactors.
Prerequisite: CHBE440; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.

ENCH648 Special Problems in Chemical Engineering (1-16 Credits)

ENCH739 Modern Computing Techniques in Process Engineering (3 Credits)
Presentation of recent developments in computing techniques in the context of chemical engineering problems. Symbolic computation and artificial intelligence, neural networks, data filtering and statistical treatment of data.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH751 Turbulent and Multiphase Transport Phenomena (3 Credits)
Basic equations and statistical theories for transport of heat, mass, and momentum in turbulent fluids with applications to processing equipment. Fundamental equations of multiphase flow for dilute systems with applications to particles, drops and bubbles. Current approaches for analysis of concentrated suspensions including deterministic models and population balance approaches.
Prerequisite: ENCH620 and ENCH630.

ENCH781 Polymer Reaction Engineering (3 Credits)
Advanced topics in polymerization kinetics, reactor design and analysis; addition and step-growth polymerization; homogeneous and heterogeneous polymerization; photopolymerization; reactor dynamics; optimal operation and control of industrial polymerization reactors.
Prerequisite: ENCH640; or permission of instructor.

ENCH799 Master's Thesis Research (1-6 Credits)

ENCH818 Advanced Topics in Thermodynamics (3 Credits)
Second semester.

ENCH828 Advanced Topics in Chemical Reaction Systems (3 Credits)
First semester. Offered in alternate years.
Prerequisite: ENCH640.

ENCH838 Advanced Topics in Transfer Theory (3 Credits)
First semester. Offered in alternate years.

ENCH858 Advanced Topics in Process Control (3 Credits)
Advanced topics in chemical process control -- robust control, model based process control, process sensing, fault detection, expert systems, neural networks, and integration of design and control.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH859 Advanced Topics in Biochemical Systems (3 Credits)
Presentation of techniques for characterizing and manipulating non-linear biochemical reaction networks. Methods are applied to current biotechnological systems, some include: recombinant bacteria; plant, insect and mammalian cells; and transformed cell lines.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH868 Advanced Topics of Process Design (3 Credits)
Advanced topics in chemical process analysis and design; construction of process models, steady-state and dynamic simulation, process synthesis, heat-exchanger networks, separation systems, chemical reaction systems, and bioprocesses.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH869 Advanced Computer-Aided Process Engineering (3 Credits)
Advanced topics and projects involving modern computing techniques in chemical and process engineering. Topics include but not restricted to advanced process simulation; parallel computation; symbolic, Boolean, and algebraic computation in process modelling; molecular-based modelling; connectionist systems.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH898 Pre-Candidacy Research (1-8 Credits)

ENCH899 Doctoral Dissertation Research (1-8 Credits)

ENEE - Electrical & Computer Engineering

ENEE407 Design & Testing of RF and Microwave Devices (2 Credits)
An introduction to state of the art design, and testing techniques of RF and microwave devices. Designs, simulations and layout of different devices are performed using the software package ADS (Advance Design System). The course highlights wide range of engineering applications including terrestrial microwave links, satellite communications, broadcasting, mobile communications and radar.
Prerequisite: Minimum grade of C- in ENEE381; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical) ; and permission of ENGR-Electrical & Computer Engineering department.

ENEE408 Capstone Design Project (3 Credits)
Culmination of prior course work in electrical and computer engineering. Utilization of modern design tools and methodologies for the design of components or systems under realistic constraints, with particular emphasis on teamwork and oral/written communication. Areas in which projects are currently offered include: microprocessor-based systems, digital systems, VLSI design (both digital and mixed-signal), and optical systems.
Prerequisite: Must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 6 credits if content differs.

ENEE411 Advanced Analog and Digital Electronics (3 Credits)
Examination of analog and digital device models for analysis, design, and simulation of transistor level electronic circuits, emphasizing Metal Oxide Silicon Field Effect Transistors (MOSFETs); fundamental single transistor configurations; frequency response, feedback, and stability of multi-transistor circuits, such as current mirrors, differential amplifiers, voltage references, operational amplifiers and data converters; complementary Metal Oxide Silicon (CMOS) implementations of static and clocked digital as well as mixed signal circuits.
Prerequisite: Minimum grade of C- in ENEE303.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer) ; and must have permission of the department.
Credit Only Granted for: ENEE411 or ENEE419A.
Formerly: ENEE419A.

ENEE413 Advanced Electronic Devices (3 Credits)
Advanced devices and their physical operation, providing a thorough description of those parts not usually covered in introductory electronics courses. These include Schottky and tunnel junctions, negative resistance devices used in wireless communication, homo-structure compound semiconductor transistors, hetero-structure (quantum effect) transistors, non-volatile memory devices, photonic devices such as LEDs and solid-state lasers, solar cells, photo-detectors and camera imagers, as well as bio-related components. Special consideration will be given to achieve an understanding of noise processes that limit electronic device performance. In all cases, system-level applications will be illustrated.
Prerequisite: Minimum grade of C- in ENEE303.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical) ; and permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: ENEE413 or ENEE480.
Formerly: ENEE480.

ENEE416 Integrated Circuit Fabrication Laboratory (3 Credits)
Characterization of wafers and fabrication steps. Oxide growth, lithography, dopant diffusion, and metal deposition and patterning will be discussed in the lectures and carried out in the lab in fabricating NMOS transistor circuits. The transistor characteristics will be measured and related to the fabrication parameters.
Prerequisite: Minimum grade of C- in ENEE303; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Formerly: ENEE419J.

ENEE417 Microelectronics Design Laboratory (2 Credits)
Students design and build fairly sophisticated circuits, mainly composed of discrete transistors and integrated circuits. Many of the projects are designed to require that students synthesize from what they have learned in many of the disciplines in electrical engineering. Students learn they can actually use their knowledge to build something very practical, which may include a high-fidelity amplifier, a radio, a memory cell, a transmitter, etc.
Prerequisite: Minimum grade of C- in ENEE303; and minimum grade of C- in ENEE307; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).

ENEE419 Topics in Microelectronics (1-3 Credits)
Selected topics of current importance in microelectronics.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).
Repeatable to: 99 credits if content differs.

ENEE420 Communication Systems (3 Credits)
Fourier series, Fourier transforms and linear system analysis; random signals, autocorrelation functions and power spectral densities; analog communication systems: amplitude modulation, single-sideband modulation, frequency and phase modulation, sampling theorem and pulse-amplitude modulation; digital communication systems pulse-code modulation, phase-shift keying, differential phase shift keying, frequency shift keying; performance of analog and digital communication systems in the presence of noise.
Prerequisite: ENEE324; and completion of all lower-division technical courses in the EE curriculum.

ENEE425 Digital Signal Processing (3 Credits)
Sampling as a modulation process; aliasing; the sampling theorem; the Z-transform and discrete-time system analysis; direct and computer-aided design of recursive and nonrecursive digital filters; the Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT); digital filtering using the FFT; analog-to-digital and digital-to analog conversion; effects of quantization and finite-word-length arithmetic.
Prerequisite: ENEE322; and completion of all lower-division technical courses in the EE curriculum.

ENEE426 Communication Networks (3 Credits)
The main design issues associated with computer networks, satellite systems, radio nets, and general communication networks. Application of analytical tools of queuing theory to design problems in such networks. Review of proposed architectures and protocols.
Prerequisite: ENEE324; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in Engineering: Electrical program.

ENEE428 Communications Design Laboratory (2 Credits)
EE capstone design course. Exploring the signal processing and communication systems theoretical concepts presented in ENEE 420 Communication Systems and ENEE 425 Digital Signal Processing by implementing them on actual DSP based hardware in real time.
Prerequisite: ENEE324; and completion of all lower-division technical courses in the EE curriculum.
Corequisite: ENEE425 or ENEE420.
Restriction: Must be in Engineering: Electrical program.

ENEE429 Topics in Communications (1-3 Credits)
Selected topics of current importance in communications.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).
Repeatable to: 99 credits if content differs.

ENEE439 Topics in Signal Processing (1-3 Credits)
Selected topics of current importance in signal processing.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 99 credits if content differs.

ENEE440 Microprocessors (3 Credits)
Microprocessor architectures, instruction sets, and applications. Bus structures, memory, I/O interfacing. Assembly language programming, LSI device configuration, and the embedding of microprocessors in systems.
Prerequisite: ENEE350; and completion of all lower division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).

ENEE445 Computer Laboratory (2 Credits)
This laboratory course focuses on the hardware/software interface in computer systems. Hand-on experiments are used to teach design, construction, analysis, and measurement of both hardware and software for embedded systems. Projects emphasize using microcontrollers for control, sensing, and communication through various I/O devices.
Prerequisite: Minimum grade of C- in ENEE205; or minimum grade of C- in ENEE206. And minimum grade of C- in ENEE350; and must have earned a minimum grade of regular (letter) C- in all 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).

ENEE446 Digital Computer Design (3 Credits)
Hardware design of digital computers. Arithmetic and logic units, adders, multipliers and dividers. Floating-point arithmetic units. Bus and register structures. Control units, both hardwired and microprogrammed. Index registers, stacks, and other addressing schemes. Interrupts, DMA and interfacing.
Prerequisite: ENEE350; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: ENEE446 or CMSC411.

ENEE447 Operating Systems (4 Credits)
The course will present the theory, design, implementation and analysis of computer operating systems. Through classroom lectures, homework, and projects, students learn the fundamentals of concurrency, process management, interprocess communication and synchronization, job scheduling algorithms, memory management, input-output devices, file systems, and protection and security in operating systems. Optional topics may include communications protocols, computer security, and real-time operating systems. The lectures will be complemented with a significant level of programming, bringing up a simple operating system from scratch, concurrently as the topics are discussed in lecture. A weekly recitation section will provide TA support and an informal laboratory atmosphere. Each student will have their own board, so development will be done largely outside the classroom at each student's pace.
Prerequisite: 1 course with a minimum grade of C- from (CMSC414, CMSC417, CMSC420, CMSC430, CMSC433, CMSC435, ENEE440, ENEE457); and permission of ENGR-Electrical & Computer Engineering department; and (ENEE350, CMSC330, and CMSC351).
Restriction: Must be in Engineering: Computer program; and permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: ENEE447, CMSC412, or ENEE459S.
Formerly: ENEE459S.

ENEE456 Cryptography (3 Credits)
The theory, application, and implementation of mathematical techniques used to secure modern communications. Topics include symmetric and public-key encryption, message integrity, hash functions, block-cipher design and analysis, number theory, and digital signatures.
Prerequisite: (CMSC106, CMSC131, or ENEE150; or equivalent programming experience); and (2 courses from (CMSC330, CMSC351, ENEE324, or ENEE380); or any one of these courses and a 400-level MATH course, or two 400-level MATH courses). Or permission of instructor. Also offered as: CMSC456, MATH456.
Credit Only Granted for: MATH456, CMSC456 or ENEE456.

ENEE457 Computer Systems Security (3 Credits)
Theoretical and practical aspects of computer systems security. Topics covered include symmetric/asymmetric encryption, message authentication, digital signatures, access control, as well as network security, web security and cloud security. Students acquire tools necessary for designing secure computer systems and programs and for defending against malicious threats (e.g., viruses, worms, denial of service).
Prerequisite: Minimum grade of C- in ENEE350; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer) ; and permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: CMSC414, ENEE459C or ENEE457.
Formerly: ENEE459C.

ENEE459 Topics in Computer Engineering (1-3 Credits)
Selected topics of current importance in computer engineering.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 99 credits if content differs.

ENEE460 Control Systems (3 Credits)
Mathematical models for control system components. Transform and time domain methods for linear control systems. Introductory stability theory. Root locus, bode diagrams and Nyquist plots. Design specifications in the time and frequency domains. Compensation design in the time and frequency domain. Introduction to sampled data systems.
Prerequisite: ENEE322; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in Engineering: Electrical program.

ENEE461 Control Systems Laboratory (3 Credits)
Students will design, implement, and test controllers for a variety of systems. This will enhance their understanding of feedback control and familiarize them with the characteristics and limitations of real control devices. They will also complete a small project. This will entail writing a proposal, purchasing parts for their controller, building the system, testing it, and writing a final report describing what they have done.
Prerequisite: Minimum grade of C- in ENEE205; and minimum grade of C- in ENEE322; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Credit Only Granted for: ENEE461, ENME461, or ENME489N.

ENEE463 Digital Control Systems (3 Credits)
Introduction to techniques for the analysis and design of linear control systems and implementation of control systems using digital technology. Topics include linearization, solution of linear equations, z-transforms and Laplace transforms, design of linear controllers, optimal control, and digital implementation of control designs. Students will use MATLAB for the solution of problems and the design of control systems.
Prerequisite: ENEE322; and completion of lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).
Formerly: ENEE469E.

ENEE469 Topics in Controls (1-3 Credits)
Selected topics of current importance in controls.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Repeatable to: 99 credits if content differs.

ENEE473 Electrical Machines Laboratory (2 Credits)
Experiments involving single and three phase transformers, induction machines, synchronous machines and D.C. machines.
Prerequisite: Minimum grade of C- in ENEE205; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Recommended: ENEE322.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).

ENEE474 Power Systems (3 Credits)
Interconnected power systems, transmission lines, load flow studies, unit commitment and economic dispatch. Three phase networks, machine models. Symmetrical components, fault analysis and unbalanced operation. Power system transients, stability and numerical methods in power system analysis.
Prerequisite: ENEE322; and completion of all lower-division technical courses in the EE curriculum.

ENEE475 Power Electronics (3 Credits)
This course is suitable for undergraduate and graduate students who want to learn the basic principles of power electronics and its applications. Special emphasis is placed on interdisciplinary nature of power electronics. Strong and intimate connections between power electronics and circuit theory, electronic circuits, semiconductor devices, electric power, magnetic, motor drives and control are stressed.
Prerequisite: Minimum grade of C- in ENEE303; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).

ENEE476 Renewable Energy (3 Credits)
Solar Energy Conversion Systems: History of Photovoltaic (PV) Systems, PV Cell, Module and Array Models and Equivalent Circuits, Characteristic Resistance, Fill Factor, Effects of Parasitic Resistances, Mismatch Effects, Shading, Bypass Diodes, Sun Tracking Systems, Maximum Power Point Tracking (MPPT) Techniques, Isolated and Non-isolated Switch-mode DC/DC for PV Systems, Inverter Design and Control, Sizing the PV Panel and Battery Pack in PV Applications. Wind Energy Conversion Systems: Introduction to Wind Energy Harvesting, Horizontal and Vertical Wind Systems, Fundamentals of Wind Energy Harvesting Systems, Variable Speed and Fixed Speed Wind Energy Conversion Systems (WECS), Wind Turbines and Different Electrical Machines in Wind Applications, Induction Machine and Dynamic Model of Induction Machines, Synchronous Generators and Dynamic Model of SG, Control of Wind Energy Conversion Systems.
Prerequisite: Minimum grade of C- in ENEE303; and completion of all lower-divisions ENEE courses with a C- or better.
Restriction: Permission of ENGR-Electrical & Computer Engineering department; and must be in one of the following programs (Engineering: Electrical; Engineering: Computer).
Credit Only Granted for: ENEE419R or ENEE476.
Formerly: ENEE419R.

ENEE486 Optoelectronics Lab (2 Credits)
Hands-on experience in performing measurements in optics and electro-optics. Basics of optics, light detectors, Fourier optics, gratings and spectrometers, pulsed dye lasers, fiber optics, electro-optics, and acousto-optics.
Prerequisite: Minimum grade of C- in ENEE205; or minimum grade of C- in ENEE206. And minimum grade of C- in PHYS271 and PHYS270; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).

ENEE488 Independent Study in Electrical and Computer Engineering (1-3 Credits)
The purpose is to provide students with an opportunity for independent study projects on advanced electrical and computer engineering topics. These projects typically involve academic investigations of technical themes that are not addressed in the established elective and special topics courses taught by the department on a regular basis. Study plans are tailored to students educational goals but are approved and supervised by faculty.
Prerequisite: Must have completed and earned a minimum grade of regular (letter) C- in all lower-division EE or CP tech electives; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 9 credits if content differs.
Additional Information: A total of 5 credits combined of ENEE488 and ENEE499 can count towards a degree in electrical and computer engineering.

ENEE489 Topics in Electrophysics (1-3 Credits)
Selected topics of current importance in electrophysics.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 99 credits if content differs.

ENEE490 Physical Principles of Wireless Communications (3 Credits)

ENEE496 Lasers and Electro-optic Devices (3 Credits)
Modern physical optics: Gaussian beams, optical resonators, optical waveguides; theory of laser oscillation, rate equations; common laser systems. Selected modern optoelectronic devices like detectors and modulators. Role of lasers and optoelectronics in modern technology.
Prerequisite: ENEE381; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).

ENEE498 Topics in Electrical Engineering (1-3 Credits)
Selected topics of current importance in electrical engineering.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in Engineering: Electrical program.
Repeatable to: 99 credits if content differs.
Formerly: ENEE488.

ENEE499 Senior Projects in Electrical and Computer Engineering (1-5 Credits)
The purpose is to provide students with an opportunity to engage in independent research projects on advanced electrical and computer engineering topics. Projects are selected by students and supervised by faculty and other qualified mentors. While students may be required to acquire new skills or information in the course of completing a 499 project, the focus is to conduct an independent investigation of a technical theme by the student. The project may be used to satisfy the advanced lab requirement if it is approved as a primarily - experimental research project. In that case, the student will enroll in ENEE499L.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in Engineering: Electrical program.
Repeatable to: 9 credits if content differs.
Formerly: ENEE418.
Additional Information: A total of 5 credits combined of ENEE448 and ENEE499 can count toward a degree in electrical or computer engineering.

ENEE600 Solid State Electronics (3 Credits)
Properties of crystals; energy bands: electron transport theory; conductivity and hall effect; statistical distributions; fermi level: impurities; non-equilibrium carrier distributions; normal modes of lattice vibration and thermal properties of crystals; tunneling phenomena; surface properties.
Prerequisite: ENEE413; and must have background in elementary quantum mechanics.
Credit Only Granted for: ENEE600 or ENEE793.
Formerly: ENEE793.

ENEE601 Semiconductor Devices and Technology (3 Credits)
The principles, structures and characteristics of semiconductor devices. Technology and fabrication of semiconductor devices.
Recommended: ENEE413 and ENEE600.
Credit Only Granted for: ENEE601 or ENEE697.
Formerly: ENEE697.

ENEE605 Design and Fabrication of Micro-Electro-Mechanical Systems (MEMS) (3 Credits)
The goals are to explore the world of Micro-Electro-Mechanical Systems (MEMS) by understanding its design and fabrication aspects.
Credit Only Granted for: ENEE605 or ENEE719R.
Formerly: ENEE719R.

ENEE610 Electrical Network Theory (3 Credits)
Matrix algebra, network elements, ports, passivity and activity, geometrical and analytical descriptions of networks, state variable characterizations, scattering matrices, signal flow graphs, sensitivity.
Prerequisite: Must have completed undergraduate-level Circuit Theory; or permission of instructor.

ENEE611 Integrated Circuit Design and Analysis (3 Credits)
Active and passive elements used in semiconductor structures. Design application of linear and digital integrated circuits.
Recommended: ENEE610.
Credit Only Granted for: ENEE611 or ENEE696.
Formerly: ENEE696.

ENEE612 Advanced Power Electronics (3 Credits)
Advanced power electronic converters, techniques to model and control switching circuits, pulse width modulation, resonant switch converters, resonant DC-link converters, series and parallel loaded resonant (SLR, PLR) DC-DC converters, zerovoltage switching clamped-voltage (ZVS-CV) converters, ZVS resonant-switch DC-DC converters are explained. In addition, this course deals with small-signal and large-signalmodeling and control of switched mode power converters, sliding-mode operation, state space models, generalized state-space averaging, and feedback linearization techniques. Multiple-input converters and their operational principles are explained. Furthermore, practical design procedures for type II and type III compensators with voltage-mode error-amplifier for DC/DC converters are explained.
Prerequisite: ENEE303, ENEE475, or ENEE476; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENEE719B or ENEE612.
Formerly: ENEE719B.

ENEE614 Radio Frequency VLSI Circuit Design (3 Credits)
This course will give students the knowledge required to analyze, design and lay-out discrete and integrated circuits used in modern radio frequency communications. The course will focus on advanced amplifier concepts, frequency conversion, tuning, and low-noise techniques. Implementation of AM, FM and digital modulation techniques will be covered. Emphasis will be given to CMOS technology as applied to analog VLSI. Advanced applications of SPICE and VLSI design layout tools will be covered.
Recommended: ENEE611.

ENEE620 Random Processes in Communication and Control (3 Credits)
Introduction to random processes: characterization, classification, representation; Gaussian and other examples. Linear operations on random processes, stationary processes: covariance function and spectral density. Linear least square waveform estimating Wiener-Kolmogroff filtering, Kalman-Bucy recursive filtering: function space characterization, non-linear operations on random processes.
Prerequisite: ENEE324; or students who have taken courses with comparable content may contact the department.

ENEE621 Estimation and Detection Theory (3 Credits)
Estimation of unknown parameters, Cramer-Rao lower bound; optimum (map) demodulation; filtering, amplitude and angle modulation, comparison with conventional systems; statistical decision theory Bayes, minimax, Neyman/Pearson, Criteria-68 simple and composite hypotheses; application to coherent and incoherent signal detection; M-ary hypotheses; application to uncoded and coded digital communication systems.
Prerequisite: ENEE620; or students who have taken courses with comparable content may contact the department.

ENEE623 Digital Communications (3 Credits)
Review of sampling and quantization, functional characterization of digital signals and transmission facilities, band-limited signals and systems. Digital modulation/demodulation techniques, error probability, intersymbol interference and its effects, adaptive equalization. Signaling with coded waveforms, fading and satellite channels, multiple access problems and protocols. Introduction to spread-spectrum Communications.
Recommended: ENEE420.

ENEE625 Multi-user Communication (3 Credits)
Basic queueing models. Store-and forward communications networks; switching modes; delay-throughput measures; capacity assignment; routing; topological design; computational aspects; flow control; error control; protocols; specification and validation; local networks; satellite and packet radio systems; multiple access schemes; stability and performance; multi-user information theory; and large scale system theory.
Prerequisite: ENEE620.

ENEE626 Error Correcting Codes (3 Credits)
Introduction to linear codes; bounds on the error correction capabilities of codes; convolutional codes with threshold, sequential and viterbi decoding; cyclic random error correcting codes; P-N sequences; cyclic and convolutional burst error correcting codes.
Prerequisite: ENEE420; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENEE626 or ENEE722.
Formerly: ENEE722.

ENEE627 Information Theory (3 Credits)
Information measures and their properties; entropy, relative entropy and mutual information. Information source models. Lossless data compression: the Kraft inequality, Shannon-Fano and Huffman codes. Typical sequences, asymptotic equipartition property, lossy source coding. Discrete memoryless channels: capacity, channel coding theorem. The additive Gaussian channel. Source coding under a fidelity constraint: rate distortion function and rate distortion theorem.
Prerequisite: ENEE620.
Credit Only Granted for: ENEE627 or ENEE721.
Formerly: ENEE721.

ENEE630 Advanced Digital Signal Processing (3 Credits)
This is the first-year graduate course in signal processing. The objective is to establish fundamental concepts of signal processing on multirate processing, parametric modeling, linear prediction theory, modern spectral estimation, and high-resolution techniques.
Prerequisite: ENEE425.
Corequisite: ENEE620.
Credit Only Granted for: ENEE624 or ENEE630.
Formerly: ENEE624.

ENEE631 Digital Image and Video Processing (3 Credits)
Foundations of digital image and video processing. Topics covered: 2-D systems and transforms; image acquisition and perception; multi-dimensional sampling; quantization; linear and non-linear techniques for image enhancement and restoration; basics on image analysis; lossless and lossy image compression; motion estimation and compensation; still image and video coding standards; applications of image and video processing.
Prerequisite: ENEE620 and ENEE630; or students who have taken courses with comparable content may contact the department.

ENEE632 Speech and Audio Processing (3 Credits)
The objective is to apply digital signal processing techniques to speech and music signals. Topics covered include acoustic theory of speech production leading to the source-filter model; acoustic and digital vocal-tract models of speech production; speech analysis-synthesis based on the short-time Fourier transform, linear prediction, and homomorphic representations; extensions to other multiresolution analysis; time-domain models for speech processing; auditory perception and speech perception; waveform and model-based speech coding using scalar and vector quantization; time-scale modification; pitch and formant estimation; application of techniques to music analysis-synthesis.
Prerequisite: ENEE620 and ENEE630.
Credit Only Granted for: ENEE739A or ENEE632.
Formerly: ENEE739A.

ENEE633 Statistical Pattern Recognition (3 Credits)
The goal is to introduce mathematical pattern analysis and recognition. Emphasis is given to parametric and non-parametric statistical pattern recognition methods and clustering with applications to speech, image and video recognition.
Prerequisite: MATH461; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Corequisite: ENEE620; or permission of instructor.
Credit Only Granted for: ENEE633 or ENEE739Q.
Formerly: ENEE739Q.

ENEE634 Space-Time Signal Process (3 Credits)
Space-time processing aspects of signal processing with applications to wireless communications are considered, including fast algorithms, numerical computation, adaptive beamforming, direction of arrivals estimation, array processing, adaptive algorithms (least means square algorithms and recursive least means square algorithms), channel equalization, blind equalization and identification, and space-time coding, modulation, and MIMO communications and signal processing.
Prerequisite: ENEE620 and ENEE630.
Credit Only Granted for: ENEE634 or ENEE724.
Formerly: ENEE724.

ENEE640 Digital CMOS VLSI Design (3 Credits)
Review of MOS transistors: fabrication, layout, characterization; CMOS circuit and logic design: circuit and logic simulation, fully complementary CMOS logic, pseudo-nMOS logic, dynamic CMOS logic, pass-transistor logic, clocking strategies; sub system design: ALUs, multipliers, memories, PLAs; architecture design: datapath, floorplanning, iterative cellular arrays, systolic arrays; VLSI algorithms; chip design and test: full custom design of chips, possible chip fabrication by MOSIS and subsequent chip testing.
Prerequisite: ENEE303 and ENEE350; or students who have taken courses with comparable content may contact the department; or permission of instructor.

ENEE641 Mathematical Foundations for Computer Engineering (3 Credits)
Mathematical modeling, design, analysis and proof techniques related to computer engineering. Probability, logic, combinatorics, set theory, and graph theory, as they pertain to the design and performance of computer engineering systems. Techniques for the design and analysis of efficient computational methods from graph theory and networks. Understanding of the limits on the efficiency of such computational methods. Translation from mathematical theory to actual programming. The course emphasizes mathematical rigor.
Credit Only Granted for: ENEE641 or ENEE759F.
Formerly: ENEE759F.

ENEE644 Computer-Aided Design of Digital Systems (3 Credits)
Design methodologies for digital systems using a modern hardware description language. Algorithmic, architectural and implementation aspects of arithmetic processing elements. Design of Complex Instruction Set (CISC), Reduced Instruction Set (RISC), and floating point processors. Synthesis, simulation and testing of processors with computer-aided design tools. Students in some sections may, on permission, fabricate VLSI chips via MOSIS.

ENEE645 Compilers and Optimization (3 Credits)
The compilation, linking and loading process. Using lexical analyzers and parsers. Intermediate forms. Global, stack and heap objects, and their addressing modes. Stack implementation. Control flow analysis and optimization. Dataflow analysis and optimization including Static, single assignment. Alias analysis.
Prerequisite: ENEE350 or CMSC216; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENEE645 or ENEE759C.
Formerly: ENEE759C.

ENEE646 Digital Computer Design (3 Credits)
Concepts and techniques for design of computer systems with improved performance. Advanced I/O systems, memory organization, pipeland and parallel processors, bus bandwidth, processor/memory interconnections, cache memory, virtual memory, multiprocessors, performance evaluation.
Prerequisite: ENEE446; or students who have taken courses with comparable content may contact the department.

ENEE648 Advanced Topics in Electrical Engineering (3 Credits)
Every semester courses intended for high degree of specialization are offered by visiting or regular electrical engineering faculty members in two or more of the areas listed in 488. The student should check with the electrical engineering office of graduate studies for a list and the description of the topics offered currently.

ENEE651 Parallel Algorithms (3 Credits)
A presentation of the theory of parallel computers and parallel processing. Models of parallel processing and the relationships between these models. Techniques for the design and analysis of efficient parallel algorithms including parallel prefix, searching, sorting, graph problems, and algebraic problems. Theoretical limits of parallelism.
Prerequisite: CMSC451; or ENEE641; or students who have taken courses with comparable content may contact the department. Also offered as: CMSC751.
Credit Only Granted for: ENEE651, ENEE759K or CMSC751.
Formerly: ENEE759K.

ENEE657 Computer Security (3 Credits)
An introduction to the principles of building secure systems. Topics include operating system (OS) security, secure network communications, software security, real-world attacks, applied cryptography, and hardware security. Within these topics, the course emphasizes the cross-cutting concerns of attacks, defenses and measurement.
Prerequisite: ENEE457 or CMSC414; or students who have taken courses with comparable content may contact the department.

ENEE660 System Theory (3 Credits)
General systems models. State variables and state space. Linearity and its implications. Controllability and observability. State space structure and representation. Realization theory and algorithmic solutions. Parameterizations of linear systems; canonical forms. Basic results from stability theory. Stabilizability. Fine structure of linear multivariable systems; minimal indices and polynomial matrices. Interplay between frequency domain and state space.
Prerequisite: ENEE460 and MATH463; or students who have taken courses with comparable content may contact the department.

ENEE661 Nonlinear Control Systems (3 Credits)
State space methods of stability analysis including second order systems and the phase plane, linearization and stability in the small, stability in the large and Lyapunov's second method. Frequency domain methods including the describing function. Popov's method and functional analytic methods. Introduction to Volterra series representations of nonlinear systems. Applications to conrol system design.
Prerequisite: ENEE660; and (MATH410 or MATH411; or students who have taken courses with comparable content may contact the department). Or permission of instructor.

ENEE662 Convex Optimization (3 Credits)
Focuses on recognizing, solving, and analyzing convex optimization problems. Convex sets, convex functions, convex and quasi-convex optimization problems. Duality theory and optimality conditions. Specific classes of problems including linear optimization (LP), semi-definite optimization (SDP), geometric programming. Algorithms for unconstrained and constrained optimization; interior-point methods. Applications in controls, communications, signal processing, statistics, and other areas.
Recommended: MATH410.
Credit Only Granted for: ENEE759F or ENEE662.

ENEE664 Optimal Control (3 Credits)
General optimization and control problems. Conditions of optimality for unconstrained and constrained optimization problems; sensitivity; duality. Introduction to linear and nonlinear programming methods. Dynamic optimization. Discrete time maximum principle and applications. Pontryagin maximum principle in continuous time. Dynamic programming. Feedback realization of optimal control.
Prerequisite: ENEE660 and MATH410; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Corequisite: MATH411; or permission of instructor.

ENEE680 Electromagnetic Theory I (3 Credits)
Theoretical analysis and engineering applications of Maxwell's equations. Boundary value problems of electrostatics and magnetostatics.
Prerequisite: ENEE381; or students who have taken courses with comparable content may contact the department.

ENEE681 Electromagnetic Theory II (3 Credits)
Continuation of ENEE 680. Theoretical analysis and engineering applications of Maxwell's equations. The homogeneous wave equation. Plane wave propagation. The interaction of plane waves and material media. Retarded potentials. The Hertz potential. Simple radiating systems. Relativisitic covariance of Maxwell's equations.
Prerequisite: ENEE381; or students who have taken courses with comparable content may contact the department.

ENEE686 Charged Particle Dynamics, Electron and Ion Beams (3 Credits)
General principles of single-particle dynamics; mapping of the electric and magnetic fields; equation of motion and methods of solution; production and control of charge particle beams; electron optics; Liouville's theorem; space charge effects in high current beams; design principles of special electron and ion beam devices.
Restriction: Permission of instructor.

ENEE690 Quantum and Wave Phenomena with Electrical Application (3 Credits)
Introduction of quantum and wave phenomena from electrical engineering point of view. Topics included: general principles of quantum mechanics, operator algebra, the microwave resonant cavity and the analagous potential well problem, harmonic oscillator, hydrogenic atom. Perturbation method applied to the transmission line and potential well problems. Periodically loaded transmission line and Kronig-Penny model of band theory.
Prerequisite: ENEE381; or students who have taken courses with comparable content may contact the department.

ENEE691 Optical Communication Systems (3 Credits)
Optical components and systems. Measures of performance of optical communication systems. Topics include: single and multi-mode optical fibers, DFB and DBR lasers, transmitters and receivers, pin and APD detectors, noise analysis, receiver sensitivity modulation formats, system performance, bit-error-rate, power budget, TDM and WDM systems, network architecture.

ENEE698 Graduate Seminar (1-3 Credits)
Every semester regular seminars are held in electrical science and in the six areas of specialization offered by the electrical engineering department. They may be taken, by arrangement with the student's advisor, for repeated credit.
Restriction: Permission of instructor.

ENEE699 Independent Studies in Electrical Engineering (1-3 Credits)
Supervised individual study or project, or supervised group study or project, at an advanced level, in electrical engineering.
Repeatable to: 99 credits if content differs.
Formerly: ENEE609.

ENEE704 Physics and Simulation of Semiconductor Devices (3 Credits)
The physics of electron transport in semiconductor devices will be covered. Numerical methods for attaining solutions to transport equations will be explored. Students will also learn how to use CAD tools fro semiconductor device design. Nano-electronic devices will be introduced.
Recommended: ENEE601 and ENEE600; and exposure to quantum mechanics.
Credit Only Granted for: ENEE694 and ENEE704.
Formerly: ENEE694.

ENEE719 Advanced Topics in Microelectronics (3 Credits)

ENEE720 Wireless Communication Theory (3 Credits)
An advanced detection course that follows and builds on the foundations of the single-user detection theory covered in ENEE 621. The main goal is to introduce the students to the multiple-user communication theory, in particular, multi-user detection theory. Students are introduced to the multi-user performance criteria of effective energy, asymptotic multi-user efficiency and near-far resistance. The physical layer techniques of diversity reception/transmission, multiple transmit/receive antennas and beamforming will also be studied.
Prerequisite: ENEE620 and ENEE621.
Credit Only Granted for: ENEE720 or ENEE729W.
Formerly: ENEE729W.

ENEE729 Advanced Topics in Communication (3 Credits)

ENEE731 Image Understanding (3 Credits)
An advanced graduate level course on image understanding. Mathematical and statistical approaches to solving image understanding problems will be discussed. Topics to be covered include: optimal edge and shape detection; image understanding using Markov random field models; Monte Carlo Markov Chain techniques for image understanding; shape from shading, stereo, texture and contour; structure from motion and object recognition. Existence, uniqueness and convergence issues for many of these problems will be discussed.
Prerequisite: ENEE631 and ENEE633.
Credit Only Granted for: ENEE739J or ENEE731.
Formerly: ENEE739J.

ENEE739 Advanced Topics in Signal Processing (3 Credits)

ENEE749 Advanced Digital Systems Design (3 Credits)
VLSI architecture and algorithms; design strategies; design methodologies; system-level design; area/delay/power trade-offs; high performance systems; multi-chip modules; low-power design; hardware/software co-design; design for testability, design for manufacturability; algorithm, architecture, and component design for adaptive computing systems; prototype system development and test, possible chip fabrication by MOSIS and subsequent chip testing.
Prerequisite: ENEE640 or ENEE644.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENEE750 VLSI Design Automation (3 Credits)
Design process of VLSI circuits and systems; Computer-Aided Design (CAD) tools; system partitioning, floorplanning, placement, global and detailed routing; Field Programmable Gate Arrays (FPGAs), Multi-Chip Modules (MCMs), Printed Circuit Boards (PCBs), possible chip fabrication by MOSIS and subsequent chip testing.
Prerequisite: ENEE640.
Restriction: Permission of instructor.

ENEE757 Security in Distributed Systems and Networks (3 Credits)
Threats and countermeasures in centralized and distributed systems; communication security techniques based on encryption; symmetric and asymmetric encryption; encryption modes, including stream and block encryption, and cipher block chaining; message origin and mutual authentication; third-party and inter-realm authentication, authentication of mobile users; data confidentiality and integrity protocols; formal analysis of authentication protocols and message integrity; access control in distributed systems and networks; firewall design; case studies of security mechanisms and policies.
Prerequisite: ENEE647; or permission of instructor.

ENEE759 Advanced Topics in Computer Engineering (3 Credits)
Topics, as announced every semester, from the field of computer engineering and its applications.
Repeatable to: 99 credits if content differs.

ENEE762 Stochastic Control (3 Credits)
Stochastic control systems, numerical methods for the Ricatti equation, the separation principle, control of linear systems with Gaussian signals and quadratic cost, non-linear stochastic control, stochastic stability, introduction to stochastic games.
Prerequisite: ENEE620 and ENEE660; or students who have taken courses with comparable content may contact the department.

ENEE763 Advanced Nonlinear Control Systems (3 Credits)
General introduction to the geometric theory of nonlinear control systems. Theory of decoupling, disturbance rejection, feedback linearization, stability, stabilization, etc.
Prerequisite: ENEE661; or permission of instructor.

ENEE765 Adaptive Control (3 Credits)
General principles of adaptive control. Self-tuning regulators and model reference adaptive systems. Theoretical issues: stability, convergence, and robustness. Practical issues: implementation, computation, auto-tuning, and other successful application. Alternatives to adaptive control.
Prerequisite: ENEE660 and ENEE664; or students who have taken courses with comparable content may contact the department.

ENEE769 Advanced Topics in Controls (3 Credits)
Topics selected, as announced every semester, from the field of controls and its applications.
Repeatable to: 99 credits if content differs.

ENEE789 Advanced Topics in Electrophysics (3 Credits)
Topics selected, as announced every semester, from the field of electrophysics and its applications.
Repeatable to: 99 credits if content differs.
Formerly: ENEE788.

ENEE790 Quantum Electronics I (3 Credits)
Spontaneous emission, interaction of radiation and matter, masers, optical resonators, the gas, solid and semi-conductor lasers, electro-optical effect, propagation in anisotropic media and light modulation.
Prerequisite: Must have knowledge of quantum mechanics; or permission of instructor.

ENEE791 Quantum Electronics II (3 Credits)
Nonlinear optical effects and devices, tunable coherent light sources: optical parametric oscillator; frequency conversion and dye laser. Ultrashort pulse generation and measurement, stimulated raman effect, and applications. Interaction of acoustic and optical waves, and holography.

ENEE798 Advanced Topics in Electrical Engineering (3 Credits)
Topics selected, as announced every semester.
Formerly: ENEE648.

ENEE799 Master's Thesis Research (1-6 Credits)

ENEE889 Teaching Workshop (1 Credit)
Provide training in education for senior PhD students who contemplate an academic career, and give them the opportunity to gain some teaching experience. Emphasis is on issues that are of special importance in electrical and computer engineering education.
Restriction: Must be in ENGR: MS/PhD-Electrical Engineering (Doctoral) program; and permission of ENGR-Electrical & Computer Engineering department.
Repeatable to: 4 credits if content differs.

ENEE898 Pre-Candidacy Research (1-8 Credits)
Provide training in education for senior PhD students who contemplate an academic career, and give them the opportunity to gain some teaching experience. Emphasis is on issues that are of special importance in electrical and computer engineering education.
Restriction: Must be in ENGR: MS/PhD-Electrical Engineering (Doctoral) program; and permission of ENGR-Electrical & Computer Engineering department.
Repeatable to: 4 credits if content differs.

ENEE899 Doctoral Dissertation Research (1-8 Credits)

ENES - Engineering Science

ENES424 Engineering Leadership Capstone (3 Credits)
The work initiated in the Introduction to Engineering Leadership course brings together further exploration of leadership styles and concepts.
Prerequisite: ENES472, ENCE320, and ENES317; and permission of ENGR-A. James Clark School of Engineering.
Recommended: ENES100.

ENES440 Science, Technology and Society: Certificate Program Capstone (3 Credits)
Capstone research seminar for students in the Science, Technology and Society certificate program.
Restriction: Must be in the Science, Technology and Society certificate program; or permission of ENGR-A. James Clark School of Engineering.
Credit Only Granted for: ENES440 or UNIV401.
Formerly: UNIV401.

ENES458 Topics in International Engineering (1-4 Credits)
A variety of topics related to engineering in a global context are discussed including cultural aspects, cross-cultural communication, international standards and law, and engineering and technology issues, business behavior, attitudes and values of selected countries and regions.
Prerequisite: ENES100.
Repeatable to: 12 credits if content differs.

ENES459 Study Abroad Special Topics in Engineering IV (1-6 Credits)
Special topics course in engineering science taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ENES460 Fundamentals of Technology Start-Up Ventures (3 Credits)
Fundamental aspects of creating, organizing, funding, managing, and growing a technology startup venture. This multidisciplinary course will draw on management, business, legal, financial, as well as technical, concepts. Students form teams and develop a business plan for a technology company, based on each team's own business idea and then present the plan to a panel of outside experts.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Credit Only Granted for: ENES460, BMGT461 or HLMN470.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES461 Advanced Entrepreneurial Opportunity Analysis in Technology Ventures (3 Credits)
Explores the factors that influence entrepreneurial opportunity analysis in technology-based ventures. Uses a cognitive theoretical framework to examine the integration of motivation, emotions and information processing modes to make complex entrepreneurial decisions in technology venture environments.
Credit Only Granted for: ENES210 or ENES461.

ENES462 Marketing High-Technology Products and Innovations (3 Credits)
Examines the opportunities and challenges of marketing high-technology products in turbulent environments requiring rapid decision making with incomplete information. Explores how innovations are introduced at frequent intervals, research-and-development spending is vital, and there are high mortality rates for both products and businesses.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES463 Strategies for Managing Innovation (3 Credits)
Emphasizes how the technology entrepreneur can use strategic management of innovation and technology to enhance firm performance. Examines the process of technological change, the ways that firms come up with innovations, the strategies that firms use to benefit from innovation, and the process of formulating technology strategy. Provides frameworks for analyzing key aspects of these industries and teaches students how to apply these frameworks.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Credit Only Granted for: ENES463, BMGT467 or HLMN472.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES464 International Entrepreneurship and Innovation (3 Credits)
Focuses on the need for every entrepreneur and innovator to understand the global market in today's hypercompetitive world, and to appreciate how to compete effectively in domestic markets by managing international competitors, suppliers, and influences. Explore how the distinction between foreign and domestic markets is becoming less pronounced. Develop skills to identify and manage opportunities on a global basis.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES466 Leading and Financing the Technology Venture (3 Credits)
Focuses on the challenges of leading and financing new technology ventures. Leadership topics include team selection and formation, aligning rewards with relative contributions of team members, and how early decisions can enable or prevent founders from achieving results that align with their individual motivations for becoming an entrepreneur. Essential tools and methods for building a strong financial foundation for a new technology venture are examined. Includes important accounting principles as well as methods for keeping financial control of the technology venture. Insights are shared on navigating the multitude of financial barriers that may block your entrepreneurial success, as well as how to grow the technology venture from concept through launch.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Credit Only Granted for: ENES466, BMGT365 or HLMN471.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES467 Engineering for Social Change (3 Credits)
Critical analysis of issues at the intersection of engineering, philanthropy and social change. How engineering design, products and processes have created social change in the past and will do so in the future through both intended and unintended consequences. Topics covered include energy, sustainability and climate change, autonomy, the digital future, low cost engineering, manufacturing, philanthropy, ethics and the impact of electronics on society, among others. Faculty and external experts will engage with students on these topics. Students will broadly engage with organizations involved in using technology for positive social impact.
Restriction: Must not be in Engineering: Mechanical program; and junior standing or higher; and must be in a major in ENGR-A. James Clark School of Engineering. Also offered as: ENME467.
Credit Only Granted for: ENES467 or ENME467.

ENES471 Legal Aspects of Entrepreneurship (3 Credits)
Explores critical legal and business issues entrepreneurs face as they build and launch a new venture. Examines real world scenarios, and addresses the legal issues at all of the important junctures along the path to success. Significant attention placed on new venture formation, intellectual property management, and financing arrangements.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES472 International Business Cultures in Engineering and Technology (3 Credits)
The goal is to provide students with an understanding of cultural aspects pertaining to global business and engineering and develop the cultural understanding, attitudes, and communication skills needed to function appropriately within an increasingly global and multicultural working environment.
Prerequisite: Permission of ENGR-A. James Clark School of Engineering.
Restriction: Sophomore standing or higher. Also offered as: SLLC472.
Credit Only Granted for: ARHU439B, ARHU439E, ARHU439T, ENES472, SLLC471, SLLC472, or SLLC473.
Formerly: ARHU439T.

ENES474 Global Perspectives of Engineering (3 Credits)
Faculty supervised research on aspects of engineering in a foreign country including leading fields of research, key world markets, and the culture of the engineering workplace. Students will produce a comprehensive report exhibiting their expertise in their chosen country and the field of engineering within.
Prerequisite: ENES100; or permission of ENGR-A. James Clark School of Engineering.
Restriction: Must be in the International Engineering Minor.
Credit Only Granted for: ENES458M or ENES474.
Formerly: ENES458M.

ENES478 Topics in Engineering Education (1 Credit)
Topics related to teaching engineering courses, particularly project-based courses. Topics can include learning styles, student development theory, multicultural issues in teaching, facilitating team experiences, assessment, and academic integrity.
Restriction: Must be in the Engineering Teaching Fellow program.
Repeatable to: 3 credits if content differs.

ENES480 Engineering Honors Seminar I (1 Credit)
Introduction to engineering leadership, professionalism, and ethics. Discussions of leadership style, elements of success, professional communication, codes of ethics, handling of ethical dilemmas, and the characteristics of a professional.
Restriction: Must be in College of Engineering Honors; and junior standing or higher.

ENES481 Engineering Honors Seminar II (1 Credit)
Introduction to engineering creativity and innovation in engineering. Application of methods of creativity to topics in communication, conducting research, and leadership.
Restriction: Must be in College of Engineering Honors; and junior standing or higher.

ENES489 Special Topics in Engineering (3-6 Credits)
Special topics in engineering.
Prerequisite: Permission of ENGR-A. James Clark School of Engineering.
Repeatable to: 6 credits if content differs.

ENES490 Quest Consulting and Innovation Practicum (4 Credits)
Final course in the QUEST Honors Fellows Program three-course curriculum. Based on a team-based consulting project with one of QUEST's professional partners. A project advisor and professional champion supervise each student team. Requires extensive out-of-class work.
Prerequisite: ENES390 or BMGT390. Also offered as: BMGT490.
Credit Only Granted for: BMGT490 or ENES490.

ENES491 Defining Consulting and Innovation Projects (3 Credits)
Cultivate relationships with new and current corporate partners and prepare project scopes for QUEST's capstone course, BMGT/ENES 490H. Requires independent work communicating with clients and class visits to a variety of potential project sites.
Prerequisite: BMGT190 or ENES190.
Restriction: Restricted to QUEST Program (TQMP) students. Also offered as: BMGT491.
Credit Only Granted for: BMGT491, ENES491 or BMGT438D.
Formerly: BMGT438D.

ENES498 Special Topics in Entrepreneurship (3 Credits)
This entrepreneurship seminar and case study-based course will explore technology entrepreneurship with a focus on leadership, marketing, team-building, and management of new technology ventures and assumes baseline knowledge of entrepreneurship. Students will learn skills needed to succeed as a technology entrepreneur and how to apply best practices for planning, launching, and growing new companies. This course is a requirement of the Hinman CEOs program.
Restriction: Must be in Hinman CEOs Program.
Repeatable to: 12 credits if content differs.

ENES499 Senior Projects in Engineering (3 Credits)
Students will work in large teams to solve a multidisciplinary research/design problem. The course will begin with students identifying opportunities, brainstorming project concepts to address these opportunities, applying lean startup and design thinking strategies, and then selecting/proposing a project for the semester. Acceptable projects will require the multidisciplinary design, construction and testing of a project within limited budget and time constraints.
Prerequisite: Permission of ENGR-A. James Clark School of Engineering; and completion of all 1XX and 2xx level (lower-division) technical courses in engineering major with a C- or better.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering.
Repeatable to: 6 credits if content differs.

ENES601 Future Faculty Program Seminar I (1 Credit)
Introduction to and development of skills necessary to obtain and succeed in a university faculty position. Emphasis on technical writing and effective presentations. Discussion of research diversification, networking, ethics and professionalism.
Restriction: Must be in the Clark School Future Faculty Program.

ENES602 Future Faculty Program Seminar II (1 Credit)
Effective teaching techniques. Basic principles of education and learning. Developing a course; promoting active learning, problem solving and critical thinking; designing exam and assignments; and communicating effectively with students.
Restriction: Must be in the Clark School Future Faculty Program.

ENES603 Future Faculty Program Seminar III (1 Credit)
Developing a successful faculty research program. Establishing and maintaining a research group. Finding funding opportunities and writing grant proposals. Mentoring graduate students. Faculty position application process. Preparing research and teaching statements.
Restriction: Must be in the Clark School Future Faculty Program.

ENES604 Future Faculty Program Teaching Practicum (1 Credit)
Graduate students will co-teach a course under supervision of a faculty mentor. Graudate students will be involved in all aspects of the course including development of syllabus, presenting lectures, writing and grading examiniations, and evaluating the students in the course.
Prerequisite: ENES602.
Restriction: Must be a graduate student in the Clark School Future Faculty Program; and students for whom English is not the native language must pass the Maryland English Institute ITA Evaluation prior to enrolling in this course.

ENES658 Special Topics in Engineering in a Global Context (1-3 Credits)
Advanced topics in engineering in a global context.
Restriction: Graduate standing or permission of instructor.
Repeatable to: 12 credits if content differs.

ENES662 Innovative Ideas and Concept Development (3 Credits)
Enables aspiring entrepreneurs to understand the content, methods, and models for new venture opportunity assessment and analysis. Focuses on how to identify and analyze entrepreneurial opportunities for technology-based ventures by first understanding the personal self and decision-making factors. Explores how to evaluate new venture opportunities and challenges within industries and markets.

ENES663 Strategies for Managing Innovation (3 Credits)
Emphasizes how innovative leaders can use strategic management of innovation and technology to enhance firm performance. It helps students to understand the process of technological change; the ways that firms come up with innovations; the strategies that firms use to benefit from innovation; and the process of formulating technology strategy. It provides frameworks for analyzing key aspects of these industries and teaches students how to apply these frameworks.
Credit Only Granted for: ENES663 or ENPM691.

ENES664 Business Modeling and Customer Validation (3 Credits)
Focuses on how to create and deliver value for customers and extract value for the new venture. Develop business models that encompass the product or service, customers, and the economic engine to meet the venture's financial and growth objectives. Introduces a structured way to think about, analyze, and develop a sound business model that is customer validated.
Prerequisite: ENES662 and ENES663.

ENES665 Innovative Thinking (3 Credits)
Introduces students to new and powerful tools to boost their creative problem solving skills. Participants re-discover their communication and teaming skills. Students unlock their creativity potential, and explore win-win approaches to define and solve problems of different kinds. Students are also introduced to topics related to intellectual property.
Prerequisite: ENES662 and ENES663.

ENES666 Creative Design, Prototyping, and Testing (3 Credits)
Transition from creative, innovative, design thinking methods to prototyping and concept testing of products and services. Learn how to translate ideas into marketable offerings to create real value for customers and the new venture. Emphasis is placed on an integrated and interdisciplinary approach to engineering design, concurrent engineering, design for manufacturing, industrial design, and the business of new product development. Topics include design methods, modeling and simulation, material and manufacturing process selection, platform and modular design, mass customization, planning and scheduling, and business issues, teamwork, group dynamics, creativity, and innovation.
Prerequisite: ENES664 and ENES665.

ENES667 Market Development and Commercialization (3 Credits)
Provides an orientation to key marketing concepts critical to marketing technology-based products and services. Learn to identify market opportunities, understand customer preferences, evaluate market acceptance, and devise the appropriate going to market strategies for the new venture.
Prerequisite: ENES664 and ENES665.

ENES668 Corporate Technology Entrepreneurship (3 Credits)
Focuses on the role of entrepreneurial individuals inside of existing technology organizations. Explores developing and leading innovation inside the firm. Discusses stages of innovation in the corporate entrepreneurship process and dynamics of organizational structure, politics, decisions, financing, and personal styles.
Credit Only Granted for: ENPM 808N or ENES 668.
Formerly: ENPM 808N.

ENES670 Financial Management and New Venture Financing (3 Credits)
Provides the essential tools and skills to build a strong financial foundation for a new technology venture. Examines accounting principles as well as methods for keeping firm financial control of the venture. Discusses navigating the multitude of financial barriers that may block entrepreneurial success, as well as how to raise the right amount of capital at the right time from the right source.
Prerequisite: ENES666 and ENES667.

ENES671 Legal Aspects of Entrepreneurship (3 Credits)
Explores critical legal and business issues entrepreneurs face as they build and launch a new venture. Examines real world scenarios, and addresses the legal issues at all of the important junctures along the path to success. Significant attention placed on new venture formation, intellectual property management, and financing arrangements.
Prerequisite: ENES666 and ENES667.

ENES672 Launching Technology Startup Ventures (6 Credits)
Explores the processes and skills needed to launch and manage technology startup ventures. Learn how to apply best practices for planning, launching, and leading new companies. Discusses a wide range of issues of importance and concern to entrepreneurs, to include how to navigate uncertainty.
Prerequisite: ENES670 and ENES671.
Credit Only Granted for: ENES660 or ENES672.

ENFP - Engineering, Fire Protection

ENFP405 Structural Fire Protection (3 Credits)
Effects of elevated temperature on structural materials; steel, concrete, wood, gypsum, glass and reinforced plastics. Experimental evaluation of fire resistance of building assemblies. Analytical methods to evaluate fire resistance of structural members.
Prerequisite: ENES220.
Restriction: Must be in Engineering: Fire Protection program; and permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP405 or ENFP621.

ENFP410 Special Hazard Suppression Systems (3 Credits)
Analysis of application and theory of fire suppression systems. The key elements of fire suppression systems will be discussed along with how they interact for effective fire suppression design. Physical mechanisms for a variety of fire suppression approaches will be discussed including hose streams, sprinklers, water mist, foam, clean agents, and chemical agents.
Prerequisite: ENFP310 and ENFP312.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP 410, ENFP489L, ENFP 653, or ENFP629C.

ENFP411 Risk-Informed Performance Based Design (3 Credits)
Appraisal and measurement of fire safety. Application of systems analysis, probability theory, engineering economy and risk management in the identification and synthesis of components of fire protection engineering. Methods for the development of criteria for the design, evaluation and assessment of fire safety or component hazards.
Restriction: Senior standing; or permission of ENGR-Fire Protection Engineering department.

ENFP413 Advanced Life Safety Analysis (3 Credits)
Fractional effective dose (FED) methods for predicting time to incapacitation and death of fires for use in fire safety calculations. Physiology and toxicology of the fire effluent components, decomposition chemistry of common materials, standard experimental approaches. Predictive models of material production rates. People movement characteristics related to building evacuation. Formulation and application of evacuation models. Human behavior factors affecting response of people to fire situations.
Prerequisite: ENFP250.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Also offered as: ENFP613.
Credit Only Granted for: ENFP413 or ENFP613.

ENFP415 Fire Dynamics (3 Credits)
Designed to give students a quantitative understanding of fire behavior. The fundamentals of physics and chemistry of combustion are presented and used to derive key analytical relationships that describe fire growth. Application of these relationships to the analysis of common fire scenarios is emphasized.
Prerequisite: ENFP312.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Also offered as: ENFP651.
Credit Only Granted for: ENFP415 or ENFP651.

ENFP425 Enclosure Fire Modeling (3 Credits)
An introduction to enclosure fire dynamics through the development of fire modeling algorithms and the application of computer-based fire modeling techniques. The objectives of the course are: to provide a basic understanding of enclosure fire dynamics with an emphasis on a system-level viewpoint (i.e., a global description of the coupling between combustion dynamics, smoke filling, vent flows and heat transfer); and to provide an introduction to the zone modeling approach. Topics covered include a review of the mathematical formulation of zone models, a discussion of numerical integration of the zone modeling equations (using MATLAB), and an introduction to zone modeling software used by professional engineers (e.g., CFAST).
Prerequisite: ENES232, ENFP300, and ENFP312.
Restriction: Must be in Engineering: Fire Protection program; and senior standing; and permission of ENGR-Fire Protection Engineering department.

ENFP426 Computational Methods in Fire Protection (3 Credits)
Introduction to computer-based fire modeling: zone modeling and Computational Fluid Dynamics (CFD); documentation of input data, validation and verification tests.
Prerequisite: ENFP425.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP426 or ENFP416.

ENFP429 Independent Studies (1-3 Credits)
For students who have definite plans for individual study of approved problems, or study of an advanced topic selected in conjunction with the faculty.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Restriction: Must be in Engineering: Fire Protection program.
Repeatable to: 6 credits if content differs.

ENFP435 Product Liability and Regulation (3 Credits)
Key topics include, biotechnology, safety regulation, federal preemption, product liability, professional negligence, antitrust, privacy and information technology, risk modeling, environmental protection, patent, copyright, trade secrets, reverse engineering, scientific and technological evidence, international trade, engineering ethics. Examples include plane crashes, computer chip protection, human machine interfaces, nuclear power plants, internet censorship, flood control, earthquakes and biomedical technology.
Restriction: Junior standing or higher.

ENFP440 Smoke Management and Fire Alarm Systems (3 Credits)
Analysis of hazard posed by smoke in buildings. Performance characteristics of smoke management systems. Review of analytical design aids. Functional analysis and design of fire detection and alerting systems. Examination and evaluation of code criteria, performance specifications and research.
Prerequisite: ENFP300.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Also offered as: ENFP627.
Credit Only Granted for: ENFP440 or ENFP627.

ENFP464 Industrial Fire Safety (3 Credits)
Designed to introduce students to the basics of process safety with a focus on the methods and techniques that may be utilized when evaluating the existing or proposed safety protection solutions in industrial facilities. An emphasis is placed on properly identifying the hazards that are present, the risk exposure, and how best to address the risk. The foundation is laid by presenting the necessary background information on industrial processes and integrating this information with applicable fire/explosion safety science.
Prerequisite: Students must be of senior standing.
Restriction: Permission of ENGR-Fire Protection Engineering department. Also offered as: ENFP664.
Credit Only Granted for: ENFP464, ENFP489I, ENFP629I OR ENFP664..
Formerly: ENFP489I.
Additional Information: The course will be taught as a dual senior-level undergraduate course and graduate course.

ENFP465 Fire and Explosion Investigations (3 Credits)
Presents an overview of fire and explosion investigation and reconstruction. Information on field techniques, applicable standards and best practices will be presented along with how fire science and fire dynamics can be applied to forensic analysis. Additionally laboratory work will be conducted to illustrate the application of fire dynamics to forensic scenes to assist in the determination of cause and evaluation of potential fire growth scenarios. Sample experiments include 2nd item ignition tests, ignition delay tests, and the course culminates with a series of 1:12 reduced scale house burns to allow the students to investigate and document a fire. This course also qualifies the student to sit for the NAFI Certified Fire Investigator test.
Prerequisite: Student should have senior standing.
Restriction: Permission of ENGR-Fire Protection Engineering department. Also offered as: ENFP665.
Credit Only Granted for: ENFP489N, ENFP629N OR ENFP665.
Formerly: ENFP489N.
Additional Information: The course will be taught as a dual senior-level undergraduate course and graduate course.

ENFP489 Special Topics (3 Credits)
Selected topics of current importance to fire protection.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Repeatable to: 6 credits.

ENFP611 Fire Induced Flows (3 Credits)
Theoretical basis is presented for fire induced bouyancy driven flows. Plumes, ceiling jets, vent flows, compartment flows. Dimensional analysis for correlations and scale model applications. Smoke movement and combustion products.
Prerequisite: ENFP415.

ENFP613 Human Response to Fire (3 Credits)
Fractional effective dose (FED) methods for predicting time to incapacitation and death of fires for use in fire safety engineering calculations. Physiology and toxicology of fire effluent components, decomposition chemistry of common materials, standard experimental approaches. Predictive models of material production rates. People movement characteristics related to building evacuation. Formulation and application of evacuation models. Human behavior factors affecting response of people to fire situations.
Prerequisite: Permission of ENGR-Fire Protection Engineering department. Also offered as: ENFP413.

ENFP619 Graduate Seminar (1-3 Credits)

ENFP620 Fire Dynamics Laboratory (3 Credits)
Laboratory experiments are designed to illustrate fire phenomena and test theoretical models. Diffusion flames, ignition and flame spread on solids, liquid pool fires, wood crib fires, fire plumes, compartment fires.
Recommended: ENFP415.

ENFP621 Analytical Procedures of Structural Fire Protection (3 Credits)
Analysis procedures for structural components of wood, steel, concrete, composites. Structural capabilities, modifications under fire induced exposures. Calculations, computer models for predicting fire resistance ratings of structural components.
Prerequisite: ENFP312. Also offered as: ENFP621.
Credit Only Granted for: ENFP405 or ENFP621.

ENFP625 Advanced Fire Modeling (3 Credits)
Validity, utility, reliability of current computer models. Applications of models in risk assessment, underwriting, loss prediction, hazard analysis. Development and validation of specific application models.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.

ENFP626 Computational Fire Modeling (3 Credits)
Introduction to Computational Fluid Dynamics (CFD)-based fire modeling; governing equations of turbulent reacting flows; numerical approaches to the treatment of turbulence (DNS, LES, RANS); numerical methods for partial differential equations; physical modeling of enclosure fires (turbulence, combustion, thermal radiation, pyrolysis, suppression). Development of sample programs (Matlab) and use of current CFD-based fire models (FDS).
Prerequisite: ENFP300 and ENFP312.
Restriction: Permission of ENGR-Fire Protection Engineering department.

ENFP627 Smoke Detection and Management (3 Credits)
Analysis of hazard smoke. Response analysis of smoke detectors based on characteristics of detectors and properties of smoke. Performance characteristics and limitations of smoke management systems. Capabilities and limitations of analytical design aids.
Prerequisite: ENFP300. Also offered as: ENFP440.
Credit Only Granted for: ENFP627 or ENFP440.

ENFP629 Selected Topics (3-6 Credits)
Current research, studies in fire protection engineering. Future trends and significant changes in research, professional areas. The professional standards process.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Restriction: Must be in ENGR: MS Only-Fire Protection Engineering (Master's) program.
Repeatable to: 6 credits.

ENFP630 Diffusion Flames and Burning Rate Theory (3 Credits)
Basic principles of diffusion flames for gaseous, liquid, and solid fuels. Droplet burning, B number, jet combustion, boundary layer combustion, generalized methods.
Prerequisite: ENFP312.

ENFP649 Special Problems (1-3 Credits)
Advanced topics selected by the faculty from the current literature to suit the special needs and background of students, or for individual students who have definite plans of individual study.
Restriction: Must be in ENGR: MS Only-Fire Protection Engineering (Master's) program; and permission of instructor; and permission of ENGR-Fire Protection Engineering department.
Repeatable to: 6 credits if content differs.

ENFP651 Advanced Fire Dynamics (3 Credits)
A review of the basic chemistry and physics necessary to understanding fire dynamics; and of the physics of heat transfer and turbulent fluid flow will be given. The nature and structure of premixed and diffusion flames will be presented.
Credit Only Granted for: ENFP629A or ENFP651.
Formerly: ENFP629A.

ENFP652 Fire Assessment Methods (3 Credits)
This on-line course offers a comprehensive review of experimental techniques to assess fire performance characteristics of materials, products and assemblies.
Credit Only Granted for: ENFP629B or ENFP652.
Formerly: ENFP629B.

ENFP653 Advanced Fire Supression (3 Credits)
Issues related to the suppression of fires and the design of fire suppression systems. Theoretical aspects of fire suppression and extinction are considered to provide the foundation for the practical design of different types of fire suppression systems. Focus on water-based and "clean agent" fire suppression systems, with emphasis on high challenge and special hazard applications. Systems using other agents are introduced, but are not addressed in detail.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP410, ENFP489L, ENFP653, or ENFP629C.
Formerly: ENFP629C.

ENFP654 Fire Suppression Sprays (3 Credits)
Fire suppression mechanisms and goals are presented as a basis for fire suppression spray and nozzle designs. Basic spray formation theory is presented describing how sprays are generated by fire suppression nozzles (e.g. sprinklers). Methods and techniques are introduced for measuring and analyzing sprays based on their stochastic characteristics. Basic equations for evaluating the dispersion and coverage performance of sprays are presented.
Recommended: ENFP300 and ENFP312.

ENFP655 Smoke Control (3 Credits)
Introduces the student to smoke control needs, design approaches and analytical methods. Students should develop an understanding of the performance characteristics and limitations of smoke control systems and the capabilities and limitations of analytical design aids. This course gives students an opportunity to integrate a broad range of information from previous courses with material from this course, such as fluid mechanics, heat transfer, and fire dynamics, and fire modeling. Students will review data from past experimental programs and apply computer model(s).
Restriction: Permission of ENGR-CDL-Office of Advanced Engineering Education.

ENFP661 Forensic Fire Analysis (3 Credits)
This on-line course addresses the forensic analysis of structural fire incidents in terms of enclosure fire dynamics and the impact of fire safety subsystems used to prevent or mitigate the consequences of fire. These subsystems include: ignition prevention, material flammability and flame spread, fire detection and alarm, fire suppression, smoke movement and management, structural fire protection and egress systems. Failures in these subsystems are addressed in terms of differences between expected and observed performance.
Credit Only Granted for: ENFP629D or ENFP661.
Formerly: ENFP629D.

ENFP662 Performance Based Design (3 Credits)
This on-line course demonstrates how fire science can be used to solve fire protection problems in the built environment and will provide an understanding of their performance-based design process, deterministic and risk-based analysis techniques, development of design fire scenarios, trial design development and analysis, and building lifecycle management.
Credit Only Granted for: ENFP629E or ENFP662.
Formerly: ENFP629E.

ENFP663 Advanced Fire Risk Modeling (3 Credits)
This on-line course addresses the fundamentals of fire risk modeling from both theoretical and applied perspectives.
Credit Only Granted for: ENFP629R or ENFP663.
Formerly: ENFP629R.

ENFP664 Advanced Industrial Fire Safety (3 Credits)
This class is designed to introduce students to the basics of process safety with a focus on the methods and techniques that may be utilized when evaluating the existing or proposed safety protection solutions in industrial facilities. An emphasis is placed on properly identifying the hazards that are present, the risk exposure, and how best to address the risk. The foundation is laid by presenting the necessary background information on industrial processes and integrating this information with applicable fire/explosion safety science.Also offered as: ENFP464.
Credit Only Granted for: ENFP489I, ENFP629I, ENFP464, or ENFP664.
Formerly: ENFP489I and ENFP629I.

ENFP665 Advanced Fire and Explosion Investigations (3 Credits)
Presents an overview of fire and explosion investigation and reconstruction. Information on field techniques, applicable standards and best practices will be presented along with how fire science and fire dynamics can be applied to forensic analysis. Additionally laboratory work will be conducted to illustrate the application of fire dynamics to forensic scenes to assist in the determination of cause and evaluation of potential fire growth scenarios. Sample experiments include 2nd item ignition tests, ignition delay tests, and the course culminates with a series of 1:12 reduced scale house burns to allow the students to investigate and document a fire. This course also qualifies the student to sit for the NAFI Certified Fire Investigator test.
Restriction: Permission of ENGR-A. James Clark School of Engineering. Also offered as: ENFP465.
Credit Only Granted for: ENFP629N, ENFP489N OR ENFP465.
Formerly: ENFP629N.
Additional Information: The course will be taught as a dual senior-level undergraduate course and graduate course.

ENFP799 Master's Thesis Research (1-6 Credits)
Development and completion of Master's Thesis.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Recommended: Completion of ENFP graduate requirements.
Repeatable to: 6 credits.

ENGL - English

ENGL402 Chaucer (3 Credits)
Works read in Middle English. Readings may include Canterbury Tales, Troilus and Criseyde, dream visions, lyrics.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL403 Shakespeare: The Early Works (3 Credits)
Close study of selected works from the first half of Shakespeare's career. Generic issues of early histories, comedies, tragedies. Language, theme, dramatic technique, sources, and early modern English social-historical context.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL404 Shakespeare: The Later Works (3 Credits)
Close study of selected plays from the second half of Shakespeare's career. Generic issues of later tragedies, later comedies, romances. Language, theme, dramatic technique, sources, and early modern English social-historical context.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL407 Non-dramatic Literature of the Sixteenth Century (3 Credits)
Poetic and prose genres--utopia, epic, narrative, lyric, sonnet, oration, epistle, sermon, apologia--in context of the literary and intellectual life of the sixteenth century. Writers such as More, Wyatt, Surrey, Sidney, and Spenser.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL408 Literature by Women Before 1800 (3 Credits)
Selected writings by women in the medieval and early modern era.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs. Also offered as: WMST408.
Credit Only Granted for: ENGL408 or WMST408.

ENGL409 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ENGL410 Edmund Spenser (3 Credits)
Selected works of Edmund Spenser in their literary, social, and historical contexts. Special attention to The Faerie Queene; also sonnets and lyric poetry.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL412 Literature of the Seventeenth Century, 1600-1660 (3 Credits)
Works from early Stuart through Interregnum period. Major literary genres in historical contexts. Writers such as Donne, Jonson, Mary Wroth, Bacon, Browne, and Marvell.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL414 Milton (3 Credits)
Poetry and major prose in their social, political, and literary-historical contexts. Special attention to Paradise Lost. Other works may include Samson Agonistes and shorter poems.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL415 Literature of the Seventeenth Century, 1660-1700 (3 Credits)
English poetry, drama, fiction, and non-fiction written from the Restoration of Charles II to 1700. Attention to increasing literacy and publication and greater involvement by women in literary production. Authors include Milton, Dryden, Congreve, and Behn.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL416 Literature of the Eighteenth Century, 1700-1750 (3 Credits)
British literary traditions, including the poetry of Pope, the prose of Swift, the correspondence of Montagu, the drama of Gay, and early novels by Defoe, Richardson, and Fielding.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL417 Literature of the Eighteenth Century, 1750-1800 (3 Credits)
British poetry, drama, fiction, and nonfiction, emphasizing innovative forms and attitudes in genres such as the gothic novel and political writings, as well as more traditional works. Authors include Johnson, Burney, Sterne, Burke, and Wollstonecraft.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL418 Major British Writers before 1800 (3 Credits)
Two writers studied intensively each semester.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL419 Major British Writers after 1800 (3 Credits)
Two writers studied intensively each semester.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL420 English Romantic Literature (3 Credits)
British poetry, drama, fiction, and criticism c.1790 to c.1830, a period of dramatic social change and revolution in literature, philosophy, the arts, industry, and politics. Authors include Austen, Wordsworth, Coleridge, Keats, Byron, Percy, and Mary Shelley.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL422 English Victorian Literature (3 Credits)
A survey of English literature of the Victorian period. Writers may include Arnold, Browning, Tennyson, Dickens, George Eliot, Carlyle, Ruskin, Newman, and Wilde.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL425 Modern British Literature (3 Credits)
Major Modernist writers in English prose and poetry since 1900. Such writers as Eliot, Larkin, Forster, Burgess, Durrell, Henry Green, Golding, Auden, Malcolm Lowry, Joyce, and Yeats.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL428 Seminar in Language and Literature (3 Credits)
Topics will vary each semester. The course will provide a seminar experience in material or methodologies not otherwise available to the major.
Restriction: Junior standing or higher; and must be in the English Honors program or gain permission from the department.
Repeatable to: 12 credits if content differs.

ENGL429 Independent Research in English (1-6 Credits)
An advanced independent research project for qualified students, supervised by an English faculty member, on a topic not ordinarily covered in available courses.
Prerequisite: ENGL301; and two English courses (excluding fundamental studies requirement); and permission of ARHU-English department.
Restriction: Sophomore standing or higher.
Repeatable to: 9 credits if content differs.

ENGL430 American Literature, Beginning to 1810, the Colonial and Federal Periods (3 Credits)
Puritanism, the Enlightenment, early Romanticism. Writers such as Bradstreet, Franklin, Brown.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL431 American Literature: 1810 to 1865, the American Renaissance (3 Credits)
Nationalism, Sentimentalism, Transcendentalism. Writers such as Douglass, Stowe, Melville.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL432 American Literature: 1865 to 1914, Realism and Naturalism (3 Credits)
Reconstruction, Realism, Naturalism. Representative writers such as Dickinson, James, Dreiser.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL433 American Literature: 1914 to the Present, the Modern Period (3 Credits)
Modernism, Postmodernism. Writers such as Stevens, Stein, Ellison.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL435 American Poetry: Beginning to the Present (3 Credits)
Selections of American poetry, from Bradstreet to contemporary free verse. Authors such as Whitman, Dickinson, Bishop, Hughes, Rich, and Frost.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL437 Contemporary American Literature (3 Credits)
Prose, poetry, drama of living American writers. Current cultural and social issues.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL438 Major American Writers before 1865 (3 Credits)
Two writers studied intensively each semester.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL439 Major American Writers after 1865 (3 Credits)
Two writers studied intensively each semester.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL440 The Novel in America to 1914 (3 Credits)
Survey of the American novel to World War I. Cultural and philosophical contexts; technical developments in the genre. Authors such as Melville, Wells Brown, James, Sedgwick, Chopin.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL441 The Novel in America Since 1914 (3 Credits)
Survey of the American novel since World War I. Cultural and philosophical contexts, technical developments in the genre. Authors such as Hemingway, Cather, Faulkner, Anne Tyler, Morrison.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL444 Feminist Critical Theory (3 Credits)
Issues in contemporary feminist thought that have particular relevance to textual studies, such as theories of language, literature, culture, interpretation, and identity.
Prerequisite: WMST200, WMST250, or ENGL250. Also offered as: WMST444.
Credit Only Granted for: ENGL444 or WMST444.

ENGL445 Modern British and American Poetry (3 Credits)
The formation of Modernism in British and American poetry before 1930. Such poets as Yeats, Pound, H.D., Eliot, Langston Hughes, Moore, Stevens, and Williams.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL446 Post-Modern British and American Poetry (3 Credits)
British and American poets from the 1930s to the present. Such poets as Auden, Williams, Plath, Brooks, Lowell, Wolcott, Ted Hughes, Bishop, Larkin, Jarrell, and Berryman.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL448 Literature by Women of Color (3 Credits)
Literature by women of color in the United States, Britain, and in colonial and post-colonial countries.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs. Also offered as: WMST448.
Credit Only Granted for: ENGL448 or WMST448.

ENGL449 Selected Topics in U.S. Latina/o Literature (3 Credits)
Study of selected works by U.S. Latina/o writers.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: ENGL449 or ENGL479F.

ENGL450 Renaissance Drama I (3 Credits)
Drama of the sixteenth century, from Sir Thomas More's circle through Lyly, Greene, Marlowe, and their successors. Interludes, school drama, comedy and tragedy, professional theater. Influences of humanism, Protestantism, politics, and cultural change.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL451 Renaissance Drama II (3 Credits)
Drama in early decades of the seventeenth century. Playwrights include Jonson, Middleton, Marston, Webster, Beaumont and Fletcher. Tragedy, city comedy, tragicomedy, satire, masque. Pre-Civil War theatrical, political, and religious contexts.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL452 English Drama From 1660 to 1800 (3 Credits)
Restoration and eighteenth-century drama, with special attention to theater history, cultural influences, concepts of tragedy, comedy, farce, parody, and burlesque, as well as dramatic and verbal wit.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL453 Literary Theory (3 Credits)
An in-depth study of literary and critical theory.
Prerequisite: Two courses in literature; or permission of ARHU-English department.

ENGL454 Modern Drama (3 Credits)
The roots of European Modernism and its manifestation in the drama of the twentieth century. Such playwrights as Beckett, Churchill, Stoppard, Wilde, Chekhov, Ibsen, Brecht, O'Neill, Sartre, Anouilh, Williams, and Shaw.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL455 The Eighteenth-Century English Novel (3 Credits)
The origins and development of the British novel, from the late seventeenth century until the beginning of the nineteenth. Questions about what novels were, who wrote them, and who read them. Authors such as Behn, Defoe, Richardson, Fielding, Sterne, Smollett, Burney, Radcliffe, and Austen.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL456 The Nineteenth-Century English Novel (3 Credits)
Surveys major novels of the period. Attention to narrative form and realism; representations of gender and class; social contexts for reading, writing and publishing. Authors such as Austen, Bronte, Dickens, George Eliot, Trollope.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL457 The Modern Novel (3 Credits)
Modernism in the novel of the twentieth century. Such writers as Joyce, Lawrence, Murdoch, James, Forster, Faulkner, Hemingway, Fitzgerald, Ellison, Welty, Nabokov and Malamud.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL458 Literature by Women after 1800 (3 Credits)
Selected writings by women after 1800.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs. Also offered as: WMST458.
Credit Only Granted for: ENGL458 or WMST458.

ENGL459 Selected Topics in Sexuality and Literature (3 Credits)
Detailed study of sexuality as an aspect of literary and cultural expression.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL462 Folksong and Ballad (3 Credits)
A cross-section of American folk and popular songs in their cultural contexts; artists from Bill Monroe to Robert Johnson.

ENGL465 Theories of Sexuality and Literature (3 Credits)
An in-depth study of the ways in which sexuality and sexual difference create or confound the conditions of meaning in the production of literary texts. Attention to psychoanalysis, history of sexuality, feminist theory, and other accounts of sexual identity.
Prerequisite: Two lower-level English courses, at least one in literature; or permission of ARHU-English department. Also offered as: LGBT465.
Credit Only Granted for: ENGL465 or LGBT465.

ENGL466 Arthurian Legend (3 Credits)
Development of Arthurian legend in English and continental literature from Middle Ages to twentieth century. All readings in modern English.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL467 Computer and Text (3 Credits)
Examines electronic literature and other aspects of digital textuality. Topics may include interactive fiction, hypertext, image and sound works, literary games and simulations. Emphasis on critical and theoretical approaches rather than design or programming.
Prerequisite: One English course in literature; or permission of ARHU-English department.

ENGL468 Selected Topics in Film Studies (3-9 Credits)
Advanced studies in various periods and genres of film.
Prerequisite: ENGL245, FILM245, FILM283, or SLLC283; or permission of ARHU-English department.
Recommended: ENGL329, CMLT280, and ENGL245.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: ENGL468, ENGL479E-Spr 2008, ENGL479F-Spr 2009, ENGL479G-Fall 2008, or ENGL479M-Fall 2009/Fall 2010.

ENGL469 The Craft of Literature: Creative Form and Theory (3 Credits)
Examines various forms of poetry and/or fiction, emphasizing the practice of making literary art and the aesthetic and theoretical approaches that define it. Students will practice the elements of literary craft, producing and experimenting with a wide range of forms and conventions in poetry and/or fiction. They will also produce critical work that articulates and contextualizes theoretical approaches to the making of literary art.
Prerequisite: 2 ENGL courses in literature or creative writing; or permission of the ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL470 African-American Literature: The Beginning to 1910 (3 Credits)
Beginnings of African-American literature including origins of literary expression in folk tales, songs, and spirituals; slave narratives; pamphlets, essays and oratory; and the emergence of poetry and fiction. Emphasis is on interaction between literary forms and the salient political issues of the day.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL471 African-American Literature: 1910-1945 (3 Credits)
Emergence of modernism in African-American writing including debates over the definition of unique African-American aesthetics, with emphasis on conditions surrounding the production of African-American literatures.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL472 African-American Literature: 1945 to Present (3 Credits)
Transformation of African-American literatures into modern and postmodern forms. Influenced by World War II and the Civil Rights and Black Power movements, this literature is characterized by conscious attempts to reconnect literary and folk forms, the emergence of women writers, and highly experimental fiction.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL475 Postmodern Literature (3 Credits)
The origins and ongoing development of postmodern literature. Aspects of the "postmodern condition," such as the collapse of identity, the erasure of cultural and aesthetic boundaries, and the dissolution of life into textuality. The novel and other genres and media.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL478 Selected Topics in English and American Literature before 1800 (1-3 Credits)

ENGL479 Selected Topics in English and American Literature after 1800 (3 Credits)

ENGL482 History of the English Language (3 Credits)
Origin and development of the English language.
Prerequisite: ENGL280 or LING200; or permission of ARHU-English department.

ENGL483 American English (3 Credits)
Origins and development of the various dialects of English spoken in the United States.
Prerequisite: LING200 or ENGL280; or permission of ARHU-English department.

ENGL484 Advanced English Grammar (3 Credits)
Advanced study of grammatical description.
Credit Only Granted for: ENGL484 or LING402.

ENGL486 Introduction to Old English (3 Credits)
Grammar, syntax, and phonology of Old English. Works read in the original language. Poetry may include "Battle of Maldon," "Dream of the Rood," "Wanderer," "Seafarer," riddles; prose of Bede, Wulfstan, Aelfric, and other writers of Anglo-Saxon period in England.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL487 Foundations of Rhetoric (3 Credits)
Principles and approaches to the theory, criticism, and historical understanding of rhetorical discourse.
Credit Only Granted for: ENGL487 or COMM401.

ENGL488 Topics in Advanced Writing (3 Credits)
Different genres of technical and professional writing including proposal writing, computer documentation, technical report writing, instruction manuals, etc. Students will analyze models of a genre, produce their own versions, test, edit and revise them.
Repeatable to: 9 credits if content differs.

ENGL489 Special Topics in Language and Rhetoric (3 Credits)
Special topics in language and rhetoric, such as discourse analysis, semantics, or cognitive linguistics; comparative rhetoric and rhetorical theory, digital rhetorics, women's and minority rhetorics, or the history of rhetoric.
Repeatable to: 9 credits if content differs.

ENGL492 Web Authoring (3 Credits)
Workshop-based approach to web authoring from a rhetorical perspective, attending to issues of audience, purpose, medium, and context in design and development of web texts. How designers create meaning in web texts by structuring information, addressing messages, and composing arguments as a process of practical problem solving.
Prerequisite: Students must have satisfied Fundamental Studies Academic Writing requirement.
Credit Only Granted for: ENGL488A or ENGL492.
Formerly: ENGL488A.

ENGL493 Advanced Writing Theory and Practice (3 Credits)
Traditional and contemporary approaches to rhetoric and writing theory for advanced writing students who wish to develop their abilities to analyze and produce written texts in professional, public, digital, and/or advanced academic contexts.
Recommended: Satisfactory completion of professional writing requirement.
Restriction: Must have earned a minimum of 60 credits.

ENGL494 Editing and Document Design (3 Credits)
Principles of general editing for clarity, precision and correctness. Applications of the conventions of grammar, spelling, punctuation and usage, and organization for logic and accuracy. Working knowledge of the professional vocabulary of editing applied throughout the course.
Prerequisite: ENGL393 or ENGL391; or students who have taken courses with comparable content may contact the department.

ENGL495 Independent Study in Honors (1-3 Credits)
Completion and presentation of the senior honors project.
Prerequisite: ENGL373 and ENGL370.
Restriction: Must be in English Language and Literature program; and candidacy for honors in English.

ENGL497 English at Work (3 Credits)
Examines how English majors put their academic knowledge and skills to work in professional workplaces after graduation. Students learn strategies to research careers, and they shadow a person in a career of interest for a day. Students learn to compose different professional genres to write and speak about and for professional development and advancement, including inquiry letters, technical descriptions, professional portfolios, and elevator pitches. Students will critically examine the learning they have done in their undergraduate coursework and compose a vision for bringing that learning to life in their future work.
Prerequisite: ENGL301; and an ENGL course at the 300-level or higher.
Restriction: Must have earned a minimum of 60 credits.

ENGL498 Advanced Fiction Workshop (3 Credits)
An advanced class in the making of fiction. Intensive discussion of students' own fiction. Readings include both fiction and essays about fiction by practicing writers. Writing short critical papers, responding to works of fiction, and to colleagues' fiction, in-class writing exercises, intensive reading, and thinking about literature, in equal parts, and attendance at readings.
Prerequisite: ENGL352; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.
Formerly: ENGL496.

ENGL499 Advanced Poetry Workshop (3 Credits)
An advanced class in the making of poetry. Intensive discussion of students' own poems. Readings include both poetry and essays about poetry by practicing poets. Writing short critical prose pieces, responding critically to colleagues' poems, in-class and outside writing exercises, and attendance at poetry readings.
Prerequisite: ENGL353; or permission of ARHU-English department.
Repeatable to: 9 credits.
Formerly: ENGL497.

ENGL601 Literary Research and Critical Contexts (3 Credits)

ENGL602 Critical Theory and Literary Criticism (3 Credits)
An introduction to critical theory and literary criticism, with an overview of major movements (including formalism, structuralism and poststructuralism, Marxism, psychoanalysis, and feminism). Designed to help graduate students assess the various ways of approaching and writing about literature.

ENGL604 Old English (3 Credits)
Grammar, syntax, phonology and prosody of Old English. Designed to give graduate students a working knowledge of Old English and to introduce them to the major Old English texts in the original.

ENGL607 Readings in the History of Rhetorical Theory to 1900 (3 Credits)
Earlier theories of effective written discourse surveyed historically and as influenced by ethical, technical, and social change.

ENGL609 Technologies of Writing (3 Credits)
ENGL 609 - Technologies of Writing: Readings in the technologies of writing systems, print, and new media.
Restriction: Permission of ARHU-English department.
Repeatable to: 9 credits if content differs.
Additional Information: May fulfill a requirement for the MA in English with a Concentration in Rhetoric and Composition.

ENGL611 Approaches to College Composition (3 Credits)
A seminar emphasizing rhetorical and linguistic foundations for the handling of a course in freshman composition.
Prerequisite: Permission of ARHU-English department.
Additional Information: Required for graduate assistants (optional to other graduate students).

ENGL612 Approaches to Professional and Technical Writing (3 Credits)
A pedagogical approach to professional and technical writing, its history and methodolgy.

ENGL618 Writing for Professionals (3 Credits)
Writing proposals, reports, manuals, policy statements, correspondence, etc. for typical government and business settings. Principles of rhetorical and linguistic analysis and techniques for managing the review process in large organizations.
Repeatable to: 9 credits if content differs.

ENGL619 Readings in Linguistics (3 Credits)
A survey of theoretical and applied linguistics.
Restriction: Permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL620 Readings in Medieval English Literature (3 Credits)

ENGL621 Readings in Renaissance English Literature (3 Credits)

ENGL622 Readings in Seventeenth-Century English Literature (3 Credits)

ENGL623 Readings in Eighteenth-Century English Literature (3 Credits)

ENGL624 Readings in English Romantic Literature (3 Credits)

ENGL625 Readings in English Victorian Literature (3 Credits)

ENGL626 Readings in American Literature before 1865 (3 Credits)

ENGL627 Readings in American Literature, 1865-1914 (3 Credits)

ENGL628 Readings in African American Literature (3 Credits)

ENGL629 Readings in Folklore, Folklife, and Myth (3 Credits)
Readings pertaining to various genres of folklore and myth such as oral narrative, epic poetry, ballad, folksong, belief, custom and material culture, with special attention given to the history of the study of folklore including fieldwork, interpretation and the political application of these materials. Explores issues of ethnicity, geography, religion, race, gender, and class, as well as the ongoing relations between orality, literacy, print, and other media.
Restriction: Permission of ARHU-English department.
Repeatable to: 6.0 credits if content differs.

ENGL630 Readings in 20th Century English Literature (3 Credits)

ENGL631 Readings in 20th Century American Literature (3 Credits)

ENGL638 Readings in Film as Text and Cultural Form (3 Credits)
An inquiry into theoretical approaches to the cinematic text that include studies of form, culture, reception, ideological formations, historical contextualizations, and the problematics of representation.
Repeatable to: 6 credits if content differs.

ENGL648 Contemporary American Literature (3 Credits)
A survey of American literature in the 21st Century.
Restriction: Permission of ARHU-English department.
Repeatable to: 9 credits.

ENGL649 Readings in Rhetoric, Composition, and Literacy (3 Credits)
Readings in Rhetoric, Composition, and Literacy. Special Topics in the theory and research of rhetoric, composition, and literacy
Restriction: Permission of ARHU-English department.
Repeatable to: 9 credits if content differs.
Additional Information: May fulfill requirement for MA in English with a Concentration in Rhetoric and Composition.

ENGL658 Readings in Multi-Ethnic Literatures of the Americas (3 Credits)
Highlights the cultural diversity of American literatures from various periods, including Latino/a, Native American, Asian American, and African American literatures within and beyond the United States.
Restriction: Permission of English Department.
Repeatable to: 9 credits if content differs.

ENGL659 Readings in Postcolonial Literatures and Theory (3 Credits)
Readings in post-colonial, diasporic, and trans-national theory and literature.
Restriction: Permission of ARHU-English department.
Repeatable to: 6 credits if content differs.

ENGL668 Readings in Modern Literary Theory (3-6 Credits)

ENGL679 Professional and Career Mentoring for Master's Students (1-3 Credits)
Augments advising currently provided by the English Department Graduate Studies Office. Individual professional and career mentoring for MA and MFA students from a faculty member.
Repeatable to: 6 credits if content differs.

ENGL688 Poetry Workshop (3 Credits)
Poetry workshop.
Prerequisite: Permission of ARHU-English department.

ENGL689 Fiction Workshop (3 Credits)
Fiction workshop.
Prerequisite: Permission of ARHU-English department.

ENGL699 Independent Study (1-3 Credits)

ENGL701 Paradigms of Theory (3 Credits)
Exploration of the works of four or five major critical thinkers who underwrite the study of theory in the academy today, with special attention to the diversity within critical theory.

ENGL702 Cultures of Theory (3 Credits)
An exploration of the socio-historic, material, and cultural contexts of various theoretical practices and traditions.

ENGL708 Seminar in Rhetoric (3 Credits)
Topics in rhetoric: history of rhetorical theory, modern rhetorical theory, rhetorical interpretation, composition theory, rhetoric of social groups.
Repeatable to: 9 credits if content differs.

ENGL718 Seminar in Medieval Literature (3 Credits)

ENGL719 Seminar in Renaissance Literature (3 Credits)

ENGL728 Seminar in Seventeenth-Century Literature (3 Credits)

ENGL729 Seminar in Eighteenth-Century Literature (3 Credits)

ENGL738 Seminar in Nineteenth-Century Literature (3 Credits)

ENGL739 Seminar in Nineteenth-Century Literature (3 Credits)

ENGL748 Seminar in American Literature (3 Credits)

ENGL749 Studies in Twentieth-Century Literature (3 Credits)

ENGL758 Literary Criticism and Theory (3 Credits)

ENGL759 Seminar in Literature and the Other Arts (3 Credits)

ENGL768 Studies in Genre (3 Credits)

ENGL775 Seminar in Composition Theory (3 Credits)
Readings and research in recent theories of effective writing.

ENGL776 Seminar in Modern Rhetorical Theory (3 Credits)
Seminar in Modern Rhetorical Theory. Theories and trends in twentieth and twenty-first century rhetorical theory
Restriction: Permission of ARHU-English department.
Additional Information: May fulfill seminar requirements for MA in English with Concentration in Rhetoric and Composition.

ENGL778 Seminar in Folklore and Myth (3 Credits)

ENGL779 Seminar in Language Study (3 Credits)
Seminar in linguistic aspects of literature and composition.

ENGL788 Studies in Poetic Form (3 Credits)

ENGL789 Form and Theory in Fiction (3 Credits)
A variety of prose modes (mediations, psychological studies, reportage myths, collage, magic realism, satire, etc.). Some of the writers to be read include Kafka, Cather, Barth, Kundera, and Barthelme.
Prerequisite: Permission of ARHU-English department.

ENGL798 Critical Theory Colloquium (1 Credit)
An intensive advanced exploration of current problems and issues in critical theory.
Prerequisite: A course in critical theory.
Repeatable to: 10 credits if content differs. Also offered as: CMLT798.

ENGL799 Master's Thesis Research (1-6 Credits)

ENGL809 Academic Publishing Worksop (1-2 Credits)
A workshop for the preparation of articles of other critical writing for publication in academic journals or other professional venues.
Restriction: Must be in a major within ARHU-English department; and permission of instructor.
Repeatable to: 8 credits if content differs.
Additional Information: Preference will be given to doctoral students beyond coursework.

ENGL819 Seminar in Themes and Types in English Literature (3 Credits)

ENGL828 Seminar in Themes and Types in American Literature (3 Credits)

ENGL829 Seminar in Postcolonial Literatures (3 Credits)
Postcolonial, transnational, and diasporic literatures in the Anglophone world.
Restriction: Permission of ARHU-English department.
Repeatable to: 6 credits if content differs.

ENGL878 Pedagogical Mentoring for Doctoral Students (1-3 Credits)
Pedagogical mentoring by roster faculty members for graduate students teaching 200-level literature courses.
Repeatable to: 12 credits if content differs.

ENGL879 Professional Mentoring for Doctoral Students (1-3 Credits)
Augments advising currently provided by the English Department Graduate Studies Office. Individual professional and career mentoring for PhD students from a faculty member.
Repeatable to: 12 credits if content differs.

ENGL888 Practicum in English Studies (1 Credit)

ENGL898 Pre-Candidacy Research (1-8 Credits)
Pedagogical mentoring by roster faculty members for graduate students teaching 200-level literature courses.
Repeatable to: 12 credits if content differs.

ENGL899 Doctoral Dissertation Research (1-8 Credits)

ENMA - Engineering, Materials

ENMA400 Introduction to Atomistic Modeling in Materials (3 Credits)
This is an introductory course designed to study atomistic modeling and simulation techniques used in materials research. This course covers the theories, methods, and applications of atomistic-scale modeling techniques in simulating, understanding, and predicting the properties of materials. Specific topics include: molecular statics using empirical force fields; quantum mechanical methods including density functional theory; molecular dynamics simulations; and Monte Carlo and kinetic Monte Carlo modeling.
Prerequisite: ENMA300, MATH206, and ENMA460.
Recommended: Basic knowledge in quantum mechanics (preferred but not required); basic knowledge in statistical mechanics (preferred but not required). Also offered as: ENMA600.
Credit Only Granted for: ENMA489A, ENMA400, ENMA698A, or ENMA600.
Formerly: ENMA489A.

ENMA410 Materials for Energy I (3 Credits)
The goal is to demonstrate the role of materials in solving one of the most critical socio-economic issues of our time, affordable and sustainable energy. There will be a discussion of U.S. and global energy and related environmental issues. Topics covered include: fuel cells and batteries (electrochemical energy conversion and storage); catalysts and membrane separations (fossil fuel and biomass energy conversion); and nuclear fuels.
Prerequisite: Minimum grade of C- in ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA410 or ENMA489H.
Formerly: ENMA 489H.

ENMA411 Materials for Energy II (3 Credits)
Demonstrates the role of materials in solving one of the most critical socio-economic issues of our time, affordable and sustainable energy. Materials for Energy is a two-part course based on material functionality; however, they are independent and neither is a prerequisite for the other. Materials for Energy II will focus on electrical, optical, thermal, and mechanically functional materials for energy devices. Solar cells, solar fuel, solar thermal, energy efficient lighting, building energy, thermoelectric and wind energy will be covered.
Prerequisite: Minimum grade of C- in ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA411 or ENMA489I.
Formerly: ENMA489I.

ENMA412 Fundamentals of Photovoltaics (3 Credits)
Overview of the fundamentals of photovoltaic devices, including principles of operation, with emphasis on the materials science aspects of the different technologies available.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.

ENMA414 Introduction to Solid State Ionics (3 Credits)
Solid State Ionics is the study of point defects in crystalline and non-crystalline solids; defect equilibria and transport; the influence of chemical and electric potentials, interfaces, and association; and the application of ionically conducting solids in solid-state electrochemical transducer systems and devices.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA414 or ENMA489W.
Formerly: ENMA489W.

ENMA421 Design of Composites (3 Credits)
Fundamentals of design, processing and selection composite materials for structural applications will be covered. The topics include a review of all classes of materials, an in-depth analysis of micro and macro mechanical behavior including interactions at the two-phase interfaces, modeling of composite morphologies for optimal microstructures, material aspects, cost considerations, processing methods including consideration of chemical reactions and stability of the interfaces, and materials selection considerations.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA421 or ENMA489A.
Formerly: ENMA489A.

ENMA422 Radiation Effects of Materials (3 Credits)
Ionizing radiation, radiation dosimetry and sensors, radiation processing, radiation effects on: polymers, metals, semiconductors, liquids, and gases. Radiation in advanced manufacturing, radiation-physical technology.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA422 or ENMA489E.
Formerly: ENMA489E.

ENMA423 Manufacturing with Polymers (3 Credits)
Study of the process of engineering design and development of polymer formulations. Knowledge of commodity polymers and their physical properties, ability to design an extrusion process, develop the economics of a polymer manufacturing process, develop a working knowledge of characterization techniques for determination of physical and mechanical properties of polymers.
Prerequisite: ENMA300; or permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA423 and ENMA489R.
Formerly: ENMA489R.

ENMA425 Introduction to Biomaterials (3 Credits)
Examination of materials used in humans and other biological systems in terms of the relationships between structure, fundamental properties and functional behavior. Replacement materials such as implants, assistive devices such as insulin pumps and pacemakers, drug delivery systems, biosensors, engineered materials such as artificial skin and bone growth scaffolds, and biocompatibility will be covered.
Recommended: ENMA300.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: BIOE453, CHBE457, or ENMA425.

ENMA426 Reliability of Materials (3 Credits)
Students are taught the basic degradation mechanisms of materials, through the understanding of the physics, chemistry, mechanics of such mechanisms. Mechanical failure mechanisms concentrate on fatigue, and creep. Chemical failure mechanisms emphasize corrosion and oxidation. Physical mechanisms such as diffusion, electromigration, defects and defect migration, surface trapping mechanisms, charge creation and migration are also included.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA426 or ENMA489R.
Formerly: ENMA489R.

ENMA430 Nanosized Materials (3 Credits)
Practical aspects of nanoscale materials fabrication and utilization will be covered. It presents various approaches for the synthesis of nanoparticles, nanowires, and nanotubes, and discusses the unique properties observed in these structures and devices made with them.
Prerequisite: PHYS431 or ENMA460; and (CHEM231 or CHEM481).
Credit Only Granted for: ENMA430 or ENMA489G.
Formerly: ENMA489G.

ENMA431 Nanomechanics of Biomaterials (3 Credits)
Focuses on the latest scientific developments and discoveries in the nanoscale structure and properties of biological materials. The course begins with introductory lectures on the various nanostructures of biomaterials, and their physiological roles under mechanical forces. General aspects of biopolymers, protein folding, and self-assembly are also covered. Next, a series of in-depth lectures are presented on the characterization methods of nanomechanical properties using single molecule techniques. Finally, current applications of nanobiomaterials in the area of molecular machines, molecular self-assembly, and nanoscaffold are discussed.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA431 or ENMA489B.
Formerly: ENMA489B.

ENMA440 Nano Plasma Processing of Materials (3 Credits)
Sustaining mechanisms of plasmas are covered, especially low-pressure electrical gas discharges, fundamental plasma physics, sheath formation, electric and magnetic field effects, plasma-surface interactions in chemically reactive systems, plasma diagnostic techniques and selected industrial applications of low pressure plasmas.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA440, ENMA489P, ENMA640, or ENMA698P.
Formerly: ENMA489P.

ENMA441 Characterization of Materials (3 Credits)
Techniques to characterize the properties of materials whose characteristic dimensions range from nanometers to macroscopic. These include conventional crystalline and noncrystalline materials, with a special attention to materials of current technological interest. The course will include recent results from the scientific literature.
Prerequisite: ENMA300.
Restriction: Permission of ENGR-Materials Science & Engineering department; and senior standing.
Credit Only Granted for: ENMA489T or ENMA441.
Formerly: ENMA489T.

ENMA442 Nanomaterials (3 Credits)
An exploration of materials whose structure places them at the boundary between small objects and large molecules. Having characteristic dimensions in the range of 1-100 nanometers, these materials are difficult to synthesize and characterize but are nevertheless at the forefront of science and technology in many fields. Also, the methods for creating, manipulating and measuring these materials with an emphasis on the current scientific literature will be covered. The novel properties and potential applications will also be addressed.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA442 or ENMA489N.
Formerly: ENMA489N.

ENMA443 Phontonic Materials, Devices and Reliability (3 Credits)
The course focuses on the understanding of the basic optical processes in semiconductors, dielectrics and organic materials. The application of such materials in systems composed of waveguides, light emitting diodes and lasers, as well as modulators is developed.
Restriction: Permission of ENGR-Materials Science & Engineering department; and junior standing or higher.
Credit Only Granted for: ENMA443 or ENMA489Z.
Formerly: ENMA489Z.

ENMA445 Liquid Crystals and Structured Soft Materials (3 Credits)
Elective course on the properties and behavior of liquid crystals and related soft materials, and their relationship to biomaterials and to applications.
Prerequisite: MATH246, PHYS270, and PHYS271.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA445 or ENMA489L.
Formerly: ENMA489L.

ENMA460 Physics of Solid Materials (3 Credits)
Classes of materials; introduction to basic ideal and real materials' behavior including mechanical, electrical, thermal, magnetic and optical responses of materials; importance of microstructure in behavior. One application of each property will be discussed in detail.
Prerequisite: PHYS271, PHYS270, and MATH241.
Restriction: Junior standing or higher; and must be in Engineering: Materials Science program. Also offered as: PHYS431.
Credit Only Granted for: ENMA460 or PHYS431.

ENMA461 Thermodynamics of Materials (3 Credits)
Thermodynamic aspects of materials; basic concepts and their application in design and processing of materials and systems. Topics include: energy, entropy, adiabatic and isothermal processes, internal and free energy, heat capacity, phase equilibria and surfaces and interfaces.
Prerequisite: ENMA300.
Restriction: Junior standing or higher.

ENMA462 Smart Materials (3 Credits)
A fundamental understanding will be provided as it relates to the following topics: ferroic materials, ferromagnets, ferroelectric materials, shape memory alloys and multiferroic materials that are simultaneously ferromagnetic and ferroelectric. The ferroic properties will be discussed on an atomic, nano- and micro-scales so that actual and potential applications on those scales become clear. Examples of those applications will be presented.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA462 or ENMA489B.
Formerly: ENMA489B.

ENMA463 Macroprocessing of Materials (3 Credits)
Processing of modern, bulk engineering materials. Raw materials, forming, firing, finishing and joining. More emphasis on metals and ceramics than polymers.
Prerequisite: ENMA300.
Restriction: Junior standing or higher.

ENMA464 Environmental Effects on Engineering Materials (3 Credits)
Introduction to the phenomena associated with the resistance of materials to damage under severe environmental conditions. Oxidation, corrosion, stress corrosion, corrosion fatigue and radiation damage are examined from the point of view of mechanism and influence on the properties of materials. Methods of corrosion protection and criteria for selection of materials for use in radiation environments.
Prerequisite: ENMA300. Or permission of ENGR-Materials Science & Engineering department; and permission of instructor.

ENMA465 Microprocessing Materials (3 Credits)
Micro and nanoscale processing of materials. Emphasis on thin film processing for advanced technologies.
Prerequisite: ENMA300.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA363, ENMA489B, or ENMA465.
Formerly: ENMA363.

ENMA466 Advanced Materials Fabrication Laboratory (3 Credits)
This course allows students an opportunity to study advanced materials systems in depth through a combination of lectures and hands-on laboratory experiments. Students will be trained in materials processing and characterization techniques. Each student will fabricate materials and devices in our state-of-the-art nanofabrication clean room facility (Fablab), as well as evaluate them using a variety of characterization techniques.
Prerequisite: ENMA465; and permission of ENGR-Materials Science & Engineering department.

ENMA470 Materials Selection for Engineering Design (3 Credits)
Students will learn about materials classes, properties, limitations and applications and the methodology of materials selection in engineering design.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA 470 or ENMA 489O.
Formerly: ENMA 489O.

ENMA471 Kinetics, Diffusion and Phase Transformations (3 Credits)
Fundamentals of diffusion, the kinetics of reactions including nucleation and growth and phase transformations in materials.
Prerequisite: Must have completed or be concurrently enrolled in ENMA461.
Restriction: Junior standing or higher; or permission of ENGR-Materials Science & Engineering department.

ENMA472 Additive Manufacturing of Materials Course Information (3 Credits)
Additive manufacturing approaches for metals, ceramics and polymers will be explored in terms of manufacturability and how processing parameters affect microstructure and properties. The course will include projects, including a Terrapin Works project to design and build a part, to develop an understanding of the current state of additive manufacturing, its future promise and its limitations.
Prerequisite: ENMA300.
Restriction: Must be in Engineering: Materials Science program.
Credit Only Granted for: ENMA472 or ENMA672.

ENMA473 Engineering Using High Strength Metals and Alloys (3 Credits)
This is a class focused on the materials engineering challenges of applying high strength metals and alloys to solutions. The extraordinary properties of these alloys derive from (1) highly metastable microstructures, (2) high strengths and melting points of the base metals, (3) complicated processing and fabrication procedures, and (4) their resulting complex behavior in extreme environments. This course will give you the knowledge base you need to select, apply and troubleshoot the performance of high strength metals and alloys in a variety of applications.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.

ENMA474 Introduction to Computational Materials Science (3 Credits)
This is an introductory course aiming for junior and senior undergraduate students to study atomistic modeling and simulation techniques that are used in materials science. This course covers the theories and applications of atomistic scale modeling techniques to simulate, understand, and predict the properties of materials. Topics include: molecular statics, quantum mechanical methods, molecular dynamics simulations and Monte Carlo simulations.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA474 or ENMA489A.
Formerly: ENMA489A.

ENMA475 Fundamentals of Diffraction Techniques in Materials Science (3 Credits)
This course looks at the advanced methods of x-ray scattering/diffraction available thanks to the more powerful sources available to us. The availability of these sources enables us to study liquid crystals, polymers, nanomaterials, quasiorganized materials (including nano) and disordered materials.
Prerequisite: MATH246, PHYS270, and PHYS271.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA475 or ENMA489M.
Formerly: ENMA489M.

ENMA481 Introduction to Electronic and Optical Materials (3 Credits)
Electronic, optical and magnetic properties of materials. Emphasis on materials for advanced optoelectronic and magnetic devices and the relationship between properties and the processing/fabrication conditions.
Prerequisite: ENMA300; or students who have taken courses with comparable content may contact the department.

ENMA482 Introduction to Electron Microscopy (3 Credits)
An introduction of the basic principles of operation for modern electron microscopes. Details will be given on the construction of microscopes, their basic operation, and the types of questions that can be addressed with an electron microscope. Emphasis will be placed on a conceptual understanding of the underlying theories. Where appropriate, mathematical descriptions will be utilized. Upon completion of this course, students will be excepted to have a basic understanding sufficient to give interpretations of microscopy images and to suggest the correct tool or approach for certain research studies.
Prerequisite: PHYS142, PHYS122, or PHYS260.
Credit Only Granted for: ENMA482 or ENMA489J.
Formerly: ENMA489J.

ENMA484 Fundamentals of Finite Element Modeling (3 Credits)
A brief review of mechanical behavior of materials, introduction to Finite Element Modeling (FEM), and procedures for predicting mechanical behavior of materials by FEM using computer software (at present ANSYS). The FEM procedures include, setting up the model, mesh generation, data input and interpretation of the results.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA484 or ENMA489F.
Formerly: ENMA489F.

ENMA487 Capstone Preparation (1 Credit)
In preparation for the senior level design course, students will do background research and develop white papers from which teams will form around short listed design projects. The projects should focus on a society, industry, military or technological based problem in Materials Science and Engineering leading to a design and strategy to address the problem in the following course, ENMA 490. The course will include written and oral presentations of the white papers and team proposals.
Restriction: Must be in Engineering: Materials Science program; and senior standing; and permission of ENGR-Materials Science & Engineering department.

ENMA489 Selected Topics in Engineering Materials (3 Credits)
Selected topics of current importance in materials science and engineering.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 12 credits if content differs.

ENMA490 Materials Design (3 Credits)
Capstone design course. Students work in teams on projects evaluating a society or industry based materials problem and then design and evaluate a strategy to minimize or eliminate the problem; includes written and oral presentations.
Prerequisite: Minimum grade of C- in ENMA487.
Restriction: Senior standing.

ENMA495 Polymeric Engineering Materials I (3 Credits)
Study of polymeric engineering materials and the relationship to structural type. Elasticity, viscoelasticity, anelasticity and plasticity of single and multiphase materials. Emphasis is on polymetric materials.
Prerequisite: ENMA300.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA499 Senior Laboratory Project (1-3 Credits)
Students work with a faculty member on an individual laboratory project in one or more of the areas of engineering materials. Students will design and carry out experiments, interpret data and prepare a comprehensive laboratory report.
Restriction: Senior standing.

ENMA600 Advanced Atomistic Modeling in Materials (3 Credits)
This is an advanced course designed to study atomistic modeling and simulation techniques used in materials research. This course covers the theories, methods, and applications of atomistic-scale modeling techniques in simulating, understanding, and predicting the properties of materials. Specific topics include: molecular statics using empirical force fields; quantum mechanical methods including density functional theory; molecular dynamics simulations; and Monte Carlo and kinetic Monte Carlo modeling.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA600, ENMA 698A, ENMA400 or ENMA489A.
Formerly: ENMA698A.

ENMA613 Materials Science of Quantum Computing (3 Credits)
Quantum computing is the emerging field that attempts to perform information processing on a quantum mechanical state (qubit). This graduate level course targets advanced undergraduate and beginning graduate students for an introduction to this field of applied physics and the related material structures needed for elementary quantum computing. This course focuses on targeted topics of quantum mechanics and solid state physics as applicable to ion trap qubits, electron spin qubits, and superconducting qubits with connections to actual material structures their design and means of fabrication.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Recommended: Strongly recommended coursework in introduction to materials science, electronic materials, solid state physics, quantum mechanics and basic knowledge in computer programming or MATLAB.

ENMA614 Advanced Solid State Ionics (3 Credits)
Advanced solid state ionics is the higher level study of point defects in crystalline and non-crystalline solids; defect equilibria and transport; the influence of chemical and electric potentials, interfaces, and association; and the application of ionically conducting solids in solid-state electrochemical transducer systems and devices.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA 614 or ENMA 698W.
Formerly: ENMA 698W.

ENMA615 Advanced Archeology meets Technology (3 Credits)
Focus on the application of scientific methods of analysis to archaeological materials including bone, stone, pottery, and metal. Methods include absolute dating, remote sensing, optical and SEM microscopy, elemental and isotopic analysis. Laboratory sections provide hands-on experience with a variety of archaeological materials and analytical methods.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Recommended: Some knowledge of archaeology and archaeological methods, geology or chemistry is useful, but not required.

ENMA620 Polymer Physics (3 Credits)
The thermodynamics, structure, morphology and properties of polymers. Developing an understanding of the relationships between theory and observed behavior in polymeric materials.
Prerequisite: ENMA471; or permission of instructor.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA621 Advanced Design Composite Materials (3 Credits)
Fundamentals of design, processing, and selection of composite materials for structural applications are covered. The topics include a review of all classes of engineering materials, an in-depth analysis of micro and macro mechanical behavior including interactions at the two-phase interfaces, modeling of composite morphologies for optimal microstructures, material aspects, cost considerations, processing methods- including consideration of chemical reactions, stability of the interfaces and material selection.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA621 or ENMA698A.
Formerly: ENMA698A.

ENMA624 Radiation Engineering (3 Credits)
Ionizing radiation, radiation dosimetry and sensors, radiation processing, radiation effects on ; polymers, metals, semiconductors, liquid, and gas, radiation in advance manufacturing, radiation-physical technology.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA624 or ENMA698E.
Formerly: ENMA698E.

ENMA625 Biomaterials (3 Credits)
Examination of materials used in humans and other biological systems in terms of the relationships between structure, fundamental properties and functional behavior. Replacement materials such as implants, assistive devices such as insulin pumps and pacemakers, drug delivery systems, biosensors, engineered materials such as artificial skin and bone growth scaffolds, and biocompatibility will be covered.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA425, ENMA698I, BIOE698I, or ENBE453.
Formerly: ENMA698I.

ENMA626 Fundamentals of Failure Mechanisms (3 Credits)
Advanced failure mechanisms in reliability engineering wiil be taught from a basic materials and defects point of view. The methods of predicting the physics of failure of devices, materials, components and systems are reviewed. The main emphasis will be given to basic degradation mechanisms through understanding the physics, chemistry, and mechanics of such mechanisms. Mechanical failures are introduced through understanding fatigue, creep and yielding in materials, devices and components. The principles of cumulative damage and mechanical yielding theory are taught. The concepts of reliability growth, accelerated life testing, environmental testing are introduced. Physical, chemical and thermal related failures are introduced through a basic understanding of degradation mechanisms such as diffusion, electromigration, defects and defect migration. The failure mechanisms in basic material types will be taught. Failure mechanisms observed in real electronic devices and electronic packaging will also be presented. Problems related to manufacturing, and microelectronics will be analyzed. Mechanical failures are emphasized from the point of view of complex fatigue theory.
Restriction: Permission of ENGR-Materials Science & Engineering department. Also offered as: ENRE600.
Credit Only Granted for: ENMA626, ENMA698M, ENMA698R, or ENRE600.
Formerly: ENMA698M and ENMA698R.

ENMA627 Nanotechnology Characterization (3 Credits)
Techniques to characterize the properties of materials whose characteristic dimensions are a few to a few hundred nanometers, including "conventional" nanocrystalline materials, but concentrating on "novel" nanomaterials: carbon nanotubes, quantum dots, quantum wires, and quantum wells will be covered. The emphasis is on recent results from the scientific literature concerning those properties that make nanostructures interesting: quantum effects, novel transport phenomena, enhanced mechanical properties associated with localization and with small crystalline size.
Credit Only Granted for: ENMA627 or ENME698T.
Formerly: ENMA698T.

ENMA630 Advanced Nanosized Materials: Synthesis and Utilization (3 Credits)
This course covers fundamental theory and fabrication-related aspects of nanoscale materials science. Topics: Quantization of energy level in solids and its effect on properties. Nucleation, growth and aging. Nano-epitaxy. Anisotropic crystal engineering. Electrical Transport. Nano-magnetism. Properties of carbon nanotubes. Applications in electronics, optics, data storage, energy and biomedicine.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA630 or ENMA6998G.
Formerly: ENMA698G.

ENMA631 Advanced Nanomechanics of Biomaterials (3 Credits)
Students will develop understanding of the latest scientific developments and discoveries in the nanoscale structure and properties of biological materials. Topics include nanostructures of biomaterials, physiological roles under mechanical forces, biopolymers, protein folding, and self-assembly. Also included are characterization methods of nanomechanical properties using single molecule techniques. Current applications of nanobiomaterials in the area of molecular machines, molecular self-assembly, and nanoscaffold are discussed.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA631 or ENMA698B.
Formerly: ENMA698B.

ENMA640 Advanced Nano Processing of Materials with Plasma (3 Credits)
Plasmas are used to control the micro-and Nanoscale level structure of materials including patterning at the micro-and nanoscale level using plasma etching techniques. The course establishes the scientific understanding required for the efficient production of nano-structure using plasma techniques.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA440, ENMA489P, ENMA698P, or ENMA640.
Formerly: ENMA698P.

ENMA641 Nanotechnology Characterization (3 Credits)
Techniques to characterize the properties of materials whose characteristic dimensions are a few to a few hundred nanometers, including conventional nanocrystalline materials, but concentrating on novel nanomaterials: carbon nanotubes, quantum dots, quantum wires, and quantum wells are covered. The emphasis is on recent results from the scientific literature concerning those properties that make nanostructures interesting: quantum effects, novel transport phenomena, enhanced mechanical properties associated with localization and with small crystallite size.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA698T or ENMA641.
Formerly: ENMA698T.

ENMA642 Current Trends in Nanomaterials (3 Credits)
Presents a historical and contemporary perspective of the trends of development of nanomaterials. Having characteristic dimensions in the range of 1-100 nanometers, these materials are difficult to synthesize a nd characterize but are nevertheless at the forefront of science and tec hnology in many fields. Through detailed analysis of the current literat ure, all students will develop a sense for not only where the science an d technology has come but also where it is going.
Credit Only Granted for: ENMA642 or ENMA698N.
Formerly: ENMA698N.

ENMA643 Advanced Photonic Materials (3 Credits)
The understanding of the basic optical processes in photonic devices and systems compsed of waveguides, light emitting diodes and lasers, as well as modulators is developed. Lectures on basic degradation mechanisms of such systems will be presented. The area of organic based LED reliability will be covered from the point of view of the stability of the organic-inorganic interface.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA698Z, ENRE648Z, or ENMA643.
Formerly: ENMA698Z.

ENMA645 Advanced Liquid Crystals and Other Monomeric Soft Matter Materials (3 Credits)
Elective course on the properties and behavior of liquid crystal and related soft materials, and their relationship to biomaterials and applications.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA650 Nanometer Structure of Materials (3 Credits)
The basic concepts required for understanding nanostructured materials and their behavior will be covered. Topics covered include the structural aspects of crystalline and amorphous solids and relationships to bonding types, point and space groups. Summary of diffraction theory and practice. The reciprocal lattice. Relationships of the microscopically measured properties to crystal symmetry. Structural aspects of defects in crystalline solids.
Prerequisite: ENMA460; or students who have taken courses with comparable content may contact the department. And permission of ENGR-Materials Science & Engineering department.

ENMA659 Special Topics in Electronic Materials (3 Credits)
Topics of current interest in the design and manufacture of electronic materials.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.

ENMA660 Thermodynamics in Materials Science (3 Credits)
Thermodynamics of engineering solids. Thermal, diffusional and mechanical interactions in macroscopic systems. Systems in thermal contact, systems in thermal and diffusive contact, systems in thermal and mechanical contact.
Corequisite: ENMA650.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA661 Kinetics of Reactions in Materials (3 Credits)
The theory of thermally activated processes in solids as applied to diffusion, nucleation and interface motion. Cooperative and diffusionless transformations. Applications selected from processes such as allotropic transformations, precipitation, martensite formation, solidification, ordering, and corrosion.
Prerequisite: ENMA660.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA662 Advanced Smart Materials (3 Credits)
This course will cover the three ferroic materials, ferromagnetic, ferroelectric, and ferroelastic (also known as Shape Memory Alloy, SMA) as well as materials that are simultaneously ferromagnetic and ferroelectric etc. Their similarities and differences will be identified and their atomic level and crystal structure examined. Phase transformations are very important and will be treated in some detail. Applications, e.g. permanent magnets, electronic magnetic materials, digital storage elements, actuators and sensors as well as SMAs for vision glasses, self-adjusting valves and the like will be covered.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA664 Advanced Environmental Effects on Engineering Materials (3 Credits)
Introduction to the phenomena associated with the resistance of materials to damage under severe environmental conditions. Oxidation, corrosion, stress corrosion, corrosion fatigue and radiation damage are examined from the point of view of mechanism and influence on the properties of materials. Methods of corrosion protection and criteria for selection of materials for use in radiation related environments.
Credit Only Granted for: ENMA664 or ENMA698K.
Formerly: ENMA698K.

ENMA669 Special Topics in the Chemical Physics of Materials (3 Credits)

ENMA671 Defects in Materials (3 Credits)
Fundamental aspects of point (electronic and atomic) defects, dislocations, and surfaces and interfaces in materials. Defect interactions, defect models, and effects of zero, one and two dimensional defects on material behavior.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA674 Advanced Computational Materials Science (3 Credits)
An introduction for beginning graduate students to study atomistic modeling and simulation techniques that are used in materials science. Theories and applications of atomistic scale modeling techniques to simulate, understand, and predict the properties of materials will be covered. Topics include: molecular statics, quantum mechanical methods, molecular dynamics simulations and Monte Carlo simulations.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA674 or ENMA 698A.
Formerly: ENMA698A.

ENMA679 Special Topics in the Mechanical Behavior of Materials (3 Credits)
Topics of current interest in the mechanical behavior of materials.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA680 Determination of Structure, Chemical Composition and Defects in Materials (3 Credits)
Basic principles of electron microscopy theory, electron diffraction, and imaging theory. The electron beam sample interaction that gives rise to different signals is related to the structural and compositional information that is obtained from a sample using a TEM. The most common TEM techniques for structural characterization of a sample, namely, electron diffraction, bright/dark field imaging, and high resolution lattice imaging are discussed. Compositional information obtained from x-ray fluorescence and electron energy loss as well as the resolution of these techniques is also covered. A description of techniques used to study magnetic materials is also presented.
Prerequisite: ENMA650.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA681 Diffraction Techniques in Materials Science (3 Credits)
Advanced methods of x-ray scattering/diffraction available thanks to the more powerful sources available to us. The availability of these sources enables us to study liquid crystals, polymers, nanomaterials, quasiorganized materials (including nano) and disordered materials. We will consider scattering/diffraction from the electronic level and build up to the molecular level.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.

ENMA682 Electron Microscopy for Research (3 Credits)
An overview of the basic principles of operation for modern electron microscopes and how they are used in modern research. Details will be given on the construction of microscopes, their basic operation, and the types of questions that can be addressed with an electron microscope. Emphasis will be placed on a conceptual understanding of the underlying theories, and how to apply these to real-world research problems. Independent study into a specific area of electron microscopy will contribute to a term paper. Upon completion of this course, student will be expected to have a basic understanding sufficient to give interpretations of microscopy images and to suggest the correct tool or approach for certain research studies.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA682 or ENMA698J.
Formerly: ENMA698J.

ENMA683 Structural Determination Laboratory (1 Credit)
The operation of an electron microscope is covered. TEM techniques that are used to characterize the structure, defects and composition of a sample are presented and used to study a variety of materials. These techniques are: electron diffraction patterns, bright/dark field imaging, high resolution lattic imaging and energy dispersive x-ray spectroscopy. Also covers different sample preparation techniques for TEM. The goal is that the students become independent users of the TEM.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA698L or ENMA683.
Formerly: ENMA698L.

ENMA684 Advanced Finite Element Modeling (3 Credits)
A brief review of mechanical behavior of materials, introduction to Finite Element Modeling (FEM), and procedures for predicting mechanical behavior of materials by FEM using computer software (at present ANSYS). The FEM procedures include, setting up the model, mesh generation, data input and interpretation of the results.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA684 or ENMA698I.
Formerly: ENMA698I.

ENMA685 Advanced Electrical and Optical Materials (3 Credits)
Students become familiar with basic and state of the art knowledge of some technologically relevent topics in materials engineering and applied physics, including dielectric/ferroelectric materials, magnetic materials, superconductors, multiferroic materials and optical materials with an underlying emphasis on the thin film and device fabrication technology. Fundamental physical properties and descriptions of different materials and their applications are included. Discussion will include new developments in the fields.
Credit Only Granted for: ENMA685 or ENMA698F.
Formerly: ENMA698F.

ENMA687 Nanoscale Photonics and Applications (3 Credits)
Advanced topics in photonics including optical ray propogation, LEDS and the interaction of light in nanostructured materials for optoelectronic applications will be covered.
Credit Only Granted for: ENMA687 or ENMA698Z.
Formerly: ENMA698Z.

ENMA688 Seminar in Materials Science and Engineering (1 Credit)
Current research in materials science and engineering and related fields.
Restriction: Must be in Engineering: Materials Science program.
Repeatable to: 4 credits if content differs.
Formerly: ENMA697.

ENMA689 Special Topics in Engineering Materials (3 Credits)

ENMA698 Special Problems in Materials Science and Engineering (1-3 Credits)
Individual, supervised study in materials science and engineering.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.

ENMA797 Independent Study (3 Credits)
This course is designed to provide students with a directed independent study course in order to prepare the scholarly paper required for the master's degree without thesis degree option.

ENMA799 Master's Thesis Research (1-6 Credits)

ENMA808 Advanced Topics in Engineering Materials (3 Credits)

ENMA898 Pre-Candidacy Research (1-8 Credits)

ENMA899 Doctoral Dissertation Research (1-8 Credits)

ENME - Engineering, Mechanical

ENME400 Machine Design (3 Credits)
Design of mechanical elements and planar machines. Failure theories. Design of pressure vessels, joints, rotating elements, and transmission elements. Kinematic structures, graphical, analytical, and numerical analysis and synthesis of linkages, gear trains, and flywheels are covered.
Prerequisite: Must have completed or be concurrently enrolled in ENME361.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME406 Roller Coaster Engineering (3 Credits)
Engineering of roller coasters including: specifications, concept creation, structural design, car design, and safety. Course covers biomechanics and rider kinematics as well as manufacturing aspects.
Prerequisite: ENES220, ENES221, and ENME272. And ENME202; or MATH206.
Corequisite: ENME400.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME408 Selected Topics in Engineering Design (3 Credits)
Creativity and innovation in design. Generalized performance analysis, reliability and optimization as applied to the design of components and engineering systems. Use of computers in design of multivariable systems.
Restriction: Must be in Engineering: Mechanical program; and senior standing. Or permission of ENGR-Mechanical Engineering department.
Repeatable to: 6 credits if content differs.

ENME410 Design Optimization (3 Credits)
Introduction to the formal process of design optimization, including analytical and computational methods. Step by step design optimization techniques. Design optimization concepts, necessary and sufficient optimality conditions and solution techniques. Solution evaluation and tradeoff exploration.
Prerequisite: ENME271; or MATH206.
Restriction: Permission of ENGR-Mechanical Engineering department; and junior or senior standing.

ENME414 Computer-Aided Design (3 Credits)
Introduction to computer graphics. Plotting and drawing with computer software. Principles of writing interactive software. The applications of computer graphics in computer-aided design. Computer-aided design project.
Prerequisite: MATH241; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENME 414 or ENME272.

ENME416 Additive Manufacturing (3 Credits)
Develop a comprehensive understanding of fundamental additive manufacturing, 3D printing approaches, including: extrusion-based deposition, stereolithography, powder bed-based melting, and inkjet-based deposition. Cultivate a design for-additive manufacturing skillset for CAD and CAM methodologies to produce successful 3D prints. Fabricate 3D mechanical objects using a variety of 3D printing technologies on campus. Execute a design project that demonstrates how additive manufacturing technologies can overcome critical limitations of traditional manufacturing processes.
Prerequisite: ENME331. And ENME272; or ENME414.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME421 Engineering Design Ideation (3 Credits)
Engineering Design Methods is a technical elective for engineering students who wish to improve their ability to produce design ideas (i.e., the ideation process) for further development into conceptual ideas. Ideation is the creative, idea generation activity that happens at the beginning of the conceptual design process. Ideation methods are often built around creativity improving strategies and are often designed for individual use prior to presenting the results in a team setting.
Prerequisite: Must have completed or be concurrently enrolled in ENME371.
Restriction: Junior standing or higher.
Additional Information: Ideally, this course should be taken prior to capstone design.

ENME423 Modern Climate Control and Building Energy Design/Analysis (3 Credits)
Fundamentals and design calculations of heat and moisture transfer in buildings; evaluation of cooling, heating and power requirements of buildings; building energy consumption simulations, use of alternative energy and energy conservation measures in buildings; fundamentals of fans/pumps and air/water distribution in buildings; introduction to refrigeration and energy systems for data centers and other mission-critical facilities.
Prerequisite: ENES232.
Corequisite: ENME332.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME424 Urban Microclimate and Energy (3 Credits)
Urban microclimate from the perspective of transient heat and mass transfer using building energy simulations for building clusters as well as LEED building certification criteria. The focus is on understanding building energy consumption and environmental impacts from the individual building scale to a neighborhood scale.
Prerequisite: Must have completed or be concurrently enrolled in ENME332.
Recommended: ENME423.
Restriction: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME424 or ENME808I.

ENME426 Production Management (3 Credits)
The basic concepts and models needed to understand and design manufacturing systems, including the history of manufacturing, performance measures, queuing systems, variability, production planning and scheduling, lean manufacturing, and pull production control.
Credit Only Granted for: BMGT385 or ENME426.

ENME427 CSI Mechanical: Finding Reasons for Compromised Structural Integity (3 Credits)
Understanding the causes of product failures including the political, societal, economic, environmental, and ethical impact of these failures, and the strategies to avoid, postpone, or mitigate them. Students will be encouraged to combine concepts from engineering, natural sciences, social sciences, and the humanities to address these complex issues. Basics of failure analysis, forensics, and reliability engineering and the scientific fundamentals underlying the most common types of failure. Issues of legal liability. Methods for monitoring the existing condition of a structure.
Prerequisite: ENES220 and ENME382.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME430 Fundamentals of Nuclear Reactor Engineering (3 Credits)
Fundamental aspects of nuclear physics and nuclear engineering, including nuclear interactions; various types of radiation and their effects on materials and humans; and basic reactor physics topics, including simplified theory of reactor critically.
Prerequisite: MATH246.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME431 Nuclear Reactor Systems and Safety (3 Credits)
Engineering, material and thermal aspects of light water reactors, fast reactors, high temperature gas reactors, heavy water moderated reactors, breeder reactors, advanced reactors including GEN IV designs. Evolution of light water reactor safety and regulation in the US that has culminated in the current body of regulations.
Prerequisite: MATH246.
Recommended: ENME430.
Restriction: Permission of ENGR-Mechanical Engineering department. Also offered as: ENNU465.
Credit Only Granted for: ENNU465 and ENME431.

ENME432 Reactor and Radiation Measurements Laboratory (3 Credits)
Basics concepts of nuclear radiation and radiation detectors including types of radiation, radioactive decay, and interactions of radiation with matter.
Prerequisite: ENME430 and MATH246.
Restriction: Permission of ENGR-Mechanical Engineering department. Also offered as: ENNU440.
Credit Only Granted for: ENNU440 or ENME432.

ENME436 Renewable Energy (3 Credits)
Fundamentals, design/analysis tools, and state of the art renewable energy technologies. Energy resources and global perspectives of current and future energy demand/consumption trends, followed by prime renewable energy technologies, including wind, solar, hydro, geothermal, and ocean thermal energy conversion. Economics of renewable energy, energy conservation opportunities, CO2 capture and storage, and thermal energy storage.
Prerequisite: ENME331.
Restriction: Must be in a major within the ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME489K or ENME436.
Formerly: ENME489K.

ENME440 Applied Machine Learning for Engineering and Design (3 Credits)
Learn how to apply techniques from Artificial Intelligence and Machine Learning to solve engineering problems and design new products or systems. Design and build a personal or research project that demonstrates how computational learning algorithms can solve difficult tasks in areas you are interested in. Master how to interpret and transfer state-of-the-art techniques from computer science to practical engineering situations and make smart implementation decisions.
Prerequisite: ENME392; or permission of instructor.
Restriction: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME440, ENME808E, or ENME743.

ENME442 Information Security (3 Credits)
The materials presented are divided into three major components: overview, detailed concepts and implementation techniques. The topics to be covered are: general security concerns and concepts from both a technical and management point of view, principles of security, architectures, access control and multi-level security, trojan horses, covert channels, trap doors, hardware security mechanism, security models, security kernels, formal specifications and verification, networks and distribution systems and risk analysis.
Restriction: Must have Senior standing in engineering; and permission of ENGR-Mechanical Engineering department. Also offered as: ENRE684.
Credit Only Granted for: ENRE648J, ENME442, ENRE684, or ENPM808E.

ENME444 Assistive Robotics (3 Credits)
Fundamentals of assistive robots used in a wide varietyof ways to help humans with disabilities. Three application areas will be covered: (1) Rehabilitation robotics to recover motor function from neurologic injuries such as stroke, (2) Prosthetics to enable mobility function in amputees, and (3) Social robotics for cognitive impairment and developmental disorders such as autism. Theory behind different control systems employed by assistive robotics, as well as the mechanical design, sensors & actuators, and user interfaces behind representative robots in the respective areas. Guidelines for designing assistive robots. Ethical and regulatory considerations in the design of assistive robots.
Prerequisite: ENME351.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME445 Design for Reliability (3 Credits)
Failure prevention, accident prevention, design requirements analysis, designing right the first time, high system reliability, software reliability, manufacturing defect prevention, life cycle costs reduction, design reviews, managing the design for reliability, design trustworthiness, product durability, and writing good specifications are covered.
Restriction: Junior standing or higher.

ENME454 Vehicle Dynamics (3 Credits)
The fundamentals of passenger vehicle and light truck design and vehicle dynamics are covered. The engineering principles associated with acceleration, braking, handling, ride quality, aerodynamics, and tire mechanics are discussed, as well as suspension and steering design.
Corequisite: ENME361.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME461 Control Systems Laboratory (3 Credits)
Students will design, implement, and test controllers for a variety of systems. This will enhance their understanding of feedback control familiarize them with the characteristics and limitations of real control devices. Students will also complete a small project. This will entail writing a proposal, purchasing parts for their controller, building the system, testing it, and writing a final report describing what they have done.
Prerequisite: ENME351 and ENME361.
Restriction: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENEE461 or ENME461.

ENME462 Vibrations, Controls, and Optimization II (3 Credits)
Continuation of ENME 361. Fundamentals of vibration, controls, and optimization. Analysis and design in time, Laplace and frequency domains. Mathematical descriptions of system response, system stability, control and optimization. Optimal design of mechanical systems.
Prerequisite: ENME351 and ENME361.

ENME464 Cost Analysis for Engineers (3 Credits)
An introduction to the financial and cost analysis aspects of product engineering. Introduces key elements of traditional engineering economics including interest, present worth, depreciation, taxes, inflation, financial statement analysis, and return on investment. Provides an introduction to cost modeling as it applies to product manufacturing and support. Cost modeling topics will include: manufacturing cost analysis, life-cycle cost modeling (reliability and warranty), and cost of ownership.
Prerequisite: ENME392; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME465 Probability-Based Design (3 Credits)
Review of probabilistic distributions, introduction to pseudo-random number generation, and algorithms to produce probability distributions using Monte Carlo simulation via Matlab and other approaches to best design probabilistic engineering problems.
Prerequisite: MATH206 and ENME392.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME466 Lean Six Sigma (3 Credits)
This course intends to provide in-depth understanding of Lean Six Sigma and its Define - Mearsure - Analyze - Improve - Control (DMAIC) Breakthrough Improvement Strategy. The emphasis is placed on the DMAIC process which is reinforced via application of semester long corporate projects and case study analysis.
Prerequisite: ENME392, BMGT230, or STAT400; or students who have taken courses with comparable content may contact the department.

ENME467 Engineering for Social Change (3 Credits)
Critical analysis of issues at the intersection of engineering, philanthropy and social change. How engineering design, products and processes have impacted social change in the past and will do so in the future. Topics covered include energy, sustainability and climate change, autonomy, the digital future, low cost engineering, manufacturing, ethics and the impact of electronics on society. Faculty and external experts will engage with students on these topics. Students will award a significant amount of grant money to an organization involved in technology for social change
Restriction: Permission of ENGR-Mechanical Engineering department; and junior standing or higher.

ENME470 Finite Element Analysis (3 Credits)
Basic concepts of the theory of the finite element method. Applications in solid mechanics and heat transfer.
Restriction: Senior standing; and permission of ENGR-Mechanical Engineering department.

ENME472 Integrated Product and Process Development (3 Credits)
Integration of product development with the development process. Design strategies. Product architecture. Design for manufacturing. Selection of materials. Design for assembly.
Prerequisite: ENME371.

ENME473 Mechanical Design of Electronic Systems (3 Credits)
Design considerations in the packaging of electronic systems. Production of circuit boards and design of electronic assemblies. Vibration, shock, fatigue and thermal considerations.

ENME474 Design in Electronic Product Development (3 Credits)
Merges technology, analysis, and design concepts into a single focused activity that results in the completed design of an electronic product. A set of product requirements are obtained from an industry partner, the students create a specification for the product, iterate the specification with the industry partner, then design and analyze the product. Students will get hands-on experience using real design implementation tools for requirements capture, tradeoff analysis, scheduling, physical design and verification. Issues associated with transferring of the design to manufacturing and selection of manufacturing facilities will also be addressed.
Prerequisite: ENME473.

ENME476 Mircoelectromechanical Systems (MEMS) I (3 Credits)
Fundamentals of microelectromechanical systems (MEMS). Introduction to transducers and markets. MEMS fabrication processes and materials, including bulk micromachining, wet etching, dry etching, surface micromachining, sacrificial layers, film deposition, bonding, and non-traditional micromachining. Introduction to the relevant solid state physics, including crystal lattices, band structure, semiconductors, and doping. The laboratory covers safety, photolithography, profilometry, wet etching.
Restriction: Senior standing.
Credit Only Granted for: ENME476 or ENME489F.
Formerly: ENME489F.

ENME477 Microelectromechanical Systems (MEMS) II (3 Credits)
Fabrication of devices designed in MEMS I, including everything from mask printing through training on state-of-the-art fabrication equipment through device testing. In-depth understanding of MEMS devices and technologies, such as mechanical and electromagnetic transducers, microfluidics, and chemical sensors.
Prerequisite: ENME476.

ENME481 Lab-on-a-Chip Microsystems (3 Credits)
Fundamentals and application of lab-on-a-chip and microfluidic technologies. A broad view of the field of microfluidics, knowledge of relevant fabrication methods and analysis techniques, and an understanding of the coupled multi-domain phenomena that dominate the physics in these systems.
Restriction: Senior standing; and permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME481, ENME808E, ENME740.
Formerly: ENME489E.

ENME483 Physics of Turbulent Flow (3 Credits)
Specific problems of turbulent flow including automobile and truck aerodynamics and canonical flows including pipes, jets and boundary layers that are measured and simulated to gain basic understanding of turbulence. A goal of the course is to impart the necessary background for students to be able to critically assess and most effectively employ the turbulent flow prediction codes (e.g. Fluent) that are a mainstay of how turbulence is analyzed in modern industries.
Prerequisite: ENME331.
Restriction: Permission of ENGR-Mechanical Engineering department.
Also offered as: ENME656.
Credit Only Granted for: ENME483 or ENME656.

ENME484 Analysis of Turbulent Flow (3 Credits)
Relentless growth in the speed and size of supercomputers has encouraged the ever expanding use of numerical simulation in the practice of fluids engineering. For the flow past ground vehicles, in the urban grid, re-entering rockets, helicopters landing on ships at sea and countless other examples, the flow is turbulent, and simulation is becoming or will one day become the methodology of choice in analyzing and designing such technologies. The goal of this course is to give an introduction to the analysis of turbulent flow via simulation and the modeling that is used in its development. Among the questions to be considered: What can one hope to learn from flow simulation? What are the strengths of the approach and what obstacles inhibit its application? What kind of physical considerations are required in setting up simulations? How does one analyze the results of a simulation?
Prerequisite: ENME331.
Restriction: Permission of ENGR-Mechanical Engineering department.
Also offered as: ENME657.
Credit Only Granted for: ENME484 or ENME657.

ENME486 Computational Modeling, Simulation, and Interactive Visualization (3 Credits)
Creation of interactive graphic displays from the numerical simulation of mechanical engineering models. Brief description of each model provided, along with varied parameters to explore models' characteristics. Conclusions drawn from use of each interactive graphic. Mathematica language introduced and interwoven with the numerical simulation of the models, which will include: robotics and mechanisms, static response of beams, control systems, measurement systems, fluid flow, vibrations, geometric modeling, finite element analysis, and nonlinear phenomena.
Restriction: Senior standing; and permission of ENGR-Mechanical Engineering department.

ENME488 Special Problems (3 Credits)
Advanced problems in mechanical engineering with special emphasis on mathematical and experimental methods.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME489 Special Topics in Mechanical Engineering (3 Credits)
Selected topics of current importance in mechanical engineering.
Restriction: Permission of ENGR-Mechanical Engineering department.
Repeatable to: 6 credits.

ENME600 Engineering Design Methods (3 Credits)
An introductory graduate level course in critical thinking about formal methods for design in Mechanical Engineering. Course participants gain background on these methods and the creative potential each offers to designers. Participants will formulate, present, and discuss their own opinions on the value and appropriate use of design materials for mechanical engineering.

ENME605 Advanced Systems Control (3 Credits)
Modern control theory for both continuous and discrete systems. State space representation is reviewed and the concepts of controllability and observability are discussed. Design methods of deterministic observers are presented and optimal control theory is formulated. Control techniques for modifying system characteristics are discussed.
Prerequisite: ENME462; or permission of instructor.

ENME607 Engineering Decision Making and Risk Management (3 Credits)
Individual decision-making, group decisionmaking, and organizations of decision-makers in the context of engineering design, project management, and other functions. Techniques for making better decisions, for understanding how decisions are related to each other, and for managing risk.Also offered as: ENRE671.
Credit Only Granted for: ENME808X, ENRE671 or ENME607.
Formerly: ENME 808X.

ENME610 Engineering Optimization (3 Credits)
Overview of applied single- and multi- objective optimization and decision making concepts and techniques with applications in engineering design and/or manufacturing problems. Topics include formulation examples, concepts, optimality conditions, unconstrained/constrained methods, and post-optimality sensitivity analysis. Students are expected to work on a semester-long real-world multi-objective engineering project.

ENME611 Fiber Optics (3 Credits)
Introduces students to fiber optics, provides a background including fiber optic components and terminology, and equip students with ability to understand and evaluate various kinds of fiber optic sensors for a wide range of applications along with a detailed understanding of relevant signal processing and analysis techniques.
Credit Only Granted for: ENME611,ENME808 or ENME489R.
Formerly: ENME808R.

ENME625 Multidisciplinary Optimization (3 Credits)
Overview of single- and multi-level design optimization concepts and techniques with emphasis on multidisciplinary engineering design problems. Topics include single and multilevel optimality conditions, hierarchic and nonhierarchic modes and multilevel post optimality sensitivity analysis. Students are expected to work on a semester-long project.

ENME631 Advanced Conduction and Radiation Heat Transfer (3 Credits)
Theory of conduction and radiation. Diffused and directional, poly- and mono-chromatic sources. Quantitative optics. Radiation in enclosures. Participating media. Integrodifferential equations. Multidimensional, transient and steady-state conduction. Phase change. Coordinate system transformations.
Prerequisite: ENME332; or students who have taken courses with comparable content may contact the department; or permission of instructor.

ENME632 Advanced Convection Heat Transfer (3 Credits)
Statement of conservation of mass, momentum and energy. Laminar and turbulent heat transfer in ducts, separated flows, and natural convection. Heat and mass transfer in laminar boundary layers. Nucleate boiling, film boiling, Leidenfrost transition and critical heat flux. Interfacial phase change processes; evaporation, condensation, industrial applications such as cooling towers, condensers. Heat exchangers design.
Credit Only Granted for: ENNU615 or ENME632.

ENME633 Molecular Thermodynamics (3 Credits)
An examination of the interactions between molecules, which govern thermodynamics relevant to engineering, will be conducted. We will investigate both classical and statistical approaches to thermodynamics for understanding topics such as phase change, wetting of surfaces, chemical reactions, adsorption, and electrochemical processes. Statistical approaches and molecular simulation tools will be studied to understand how molecular analysis can be translated to macroscopic phenomena.

ENME635 Energy Systems Analysis (3 Credits)
Rankine cycles with nonazeotropic working fluid mixtures, two-, multi- and variable-stage absorption cycles and vapor compression cycles with solution circuits. Power generation cycles with working fluid mixtures. Development of rules for finding all possible cycles suiting a given application or the selection of the best alternatives.
Credit Only Granted for: ENPM635 or ENME635.

ENME640 Fundamentals of Fluid Mechanics (3 Credits)
Equations governing the conservation of mass, momentum, vorticity and energy in fluid flows. Low Reynolds number flows. Boundary layers. The equations are illustrated by analyzing a number of simple flows. Emphasis is placed on physical understanding to facilitate the study of advanced topics in fluid mechanics.
Prerequisite: Must have completed partial differential equations at the level of MATH 462; or permission of ENGR-Mechanical Engineering department.
Formerly: ENME651.

ENME641 Viscous Flow (3 Credits)
Fluid flows where viscous effects play a significant role. Examples of steady and unsteady flows with exact solutions to the Navier-Stokes equations. Boundary layer theory. Stability of laminar flows and their transition to turbulence.
Prerequisite: ENME640; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Formerly: ENME652.

ENME642 Hydrodynamics I (3 Credits)
Exposition of classical and current methods used in analysis of inviscid, incompressible flows.
Prerequisite: ENME640; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Formerly: ENME653.

ENME644 Fundamentals of Acoustics (3 Credits)
This course will cover the fundamental principles of acoustics allowing the students to go on to more advanced course in acoustics, sauch as Underwater Sound Propagation, Active Noise Control, or Radiation and Scattering from Elastic Structures.

ENME646 Computational Fluid Dynamics (3 Credits)
Fundamentals of numerical analysis of engineers. Inversion of large, sparse matrices. Numerical solution of the incompressible Navier-Stokes equations in Cartesian and curvilinear grids. Application to turbulent flows and micro-fluidics.
Prerequisite: Must have completed graduate-level fluid mechanics; or permission of instructor.

ENME647 Multiphase Flow and Heat Transfer (3 Credits)
Boiling and condensation in stationary systems, phase change heat transfer phenomenology, analysis and correlations. Fundamentals of two-phase flow natural circulation in thermal hydraulic multi-loop systems with applications to nuclear reactors safety. Multiphase flow fundamentals. Critical flow rates. Convective boiling and condensation. Multiphase flow and heat transfer applications in power and process industries.

ENME656 Physics of Turbulent Flow (3 Credits)
Definition of turbulence and its physical manifestations. Statistical methods and the transport equations for turbulence quantities. Laboratory measurement and computer simulation methods. Isotropic turbulence. Physics of turbulent shear flows.
Prerequisite: ENME640; or students who have taken courses with comparable content may contact the department; or permission of instructor.

ENME657 Analysis of Turbulent Flow (3 Credits)
Mathematical representation of turbulent transport, production and dissipation. Closure schemes for predicting flows. Recent advances in direct and large eddy numerical simulation techniques.
Prerequisite: ENME640; and (ENME641; or students who have taken courses with comparable content may contact the department). Or permission of instructor.

ENME662 Linear Vibrations (3 Credits)
Development of equations governing small oscillations and spatially continuous systems. Newton's equations, Hamilton's principle, and Lagrange's equations. Free and forced vibrations of mechanical systems. Modal analysis. Finite element discretization and reductions of continuous systems. Numerical methods. Random vibrations.

ENME664 Dynamics (3 Credits)
Kinematics in plane and space; Dynamics of particle, system of particles, and rigid bodies. Holonomic and non-holonomic constraints. Newton's equations, D'Alembert's principle, Hamilton's principle, and equations of Lagrange. Impact and collisions. Stability of equilibria.
Prerequisite: ENES221; or students who have taken courses with comparable content may contact the department; or permission of instructor.

ENME665 Advanced Topics in Vibrations (3 Credits)
Nonlinear oscillations and dynamics of mechanical and structural systems. Classical methods, geometrical, computational and analytical methods. Birfurcations of equillibrium and periodic solutions; chaos.
Prerequisite: ENME662; and permission of instructor.

ENME670 Continuum Mechanics (3 Credits)
Mechanics of deformable bodies, finite deformation and strain measures, kinematics of continua and global and local balance laws. Thermodynamics of continua, first and second laws. Introduction to constitutive theory for elastic solids, viscous fluids and memory dependent materials. Examples of exact solutions for linear and hyper elastic solids and Stokesian fluids.

ENME672 Composite Materials (3 Credits)
Micromechanics of advanced composites with passive and active reinforcements, mathematical models and engineering implications, effective properties and damage mechanics, recent advances in "adaptive" or "smart" composites.

ENME673 Energy and Variational Methods in Applied Mechanics (3 Credits)
Application of variational principles to mechanics. Includes virtual work, potential energy, strain energy, Castigliano's generalized complementary energy, and the principles of Hellinger-Reissner and Hamilton. Legendre transforms and the foundations of the calculus of variations. Singularities and stability in a potential energy function. Applications to rigid, linear and non-linear elastic, and nonconservative examples. Approximation techniques such as Ritz, Petrov-Galerkin, least-squares, etc. Presents the basis for the finite element method.

ENME674 Finite Element Methods (3 Credits)
Theory and application of finite element methods for mechanical engineering problems such as stress analysis. Basic development of the method for solving the types of governing partial differential equations that are the foundations for many engineering and physical sciences. The emphasis is on balancing the theoretical/mathematical background with a computable implementation to reach applications. Some code writing and debugging will be involved. This class is suited for graduate students or high-achieving undergraduates in engineering, mathematics, or the physical sciences. A very basic knowledge of matrix-vector calculations and multivariable calculus are required. Some exposure to partial differential equations and experience with Matlab or a compiled language will be helpful but are not required.
Restriction: Must be in one of the following programs (ENGR: MS/PhDMechanical Engineering (Master's); ENGR: MS/PhDMechanical Engineering (Doctoral)) ; or permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME 674, ENAE652, ENPM652 or ENPM808F.

ENME675 A Mathematical Introduction to Robotics (3 Credits)
Designed to provide graduate students with some of the concepts in robotics from a mathematical viewpoint, including introduction to group theory and basics of SO(3) and SE(3) group applied to robotics; rigid body motion; manipulator kinematics; introduction to holonomic & non-holonomic constraints; dynamics of robot manipulators.
Credit Only Granted for: ENME675 or ENME808V.
Formerly: ENME808V.

ENME678 Fracture Mechanics (3 Credits)
An advanced treatment of fracture mechanics covering in detail the analysis concepts for determining the stress intensity factors for various types of cracks. Advanced experimental methods for evaluation of materials or structures for fracture toughness. Analysis of moving cracks and the statistical analysis of fracture strength. Finally, illustrative fracture control plans are treated to show the engineering applications of fracture mechanics.

ENME680 Experimental Mechanics (3 Credits)
Advanced methods of measurement in solid and fluid mechanics. Scientific photography, moire, photoelasticity, strain gages, interferometry, holography, speckle, ndt techniques, shock and vibration, and laser anemometry.

ENME684 Modeling Material Behavior (3 Credits)
Constitutive equations for the response of solids to loads, heat, etc. based on the balance laws, frame invariance, and the application of thermodynamics to solids. Non-linear elasticity with heat conduction and dissipation. Linear and non-linear non-isothermal viscoelasticity with the elastic-viscoelastic correspondence principle. Classical plasticity and current viscoplasticity using internal state variables. Maxwell equal areas rule, phase change, and metastability and stability of equilibrium states. Boundary value problems. Introduction to current research areas.
Prerequisite: ENME670; or permission of instructor.

ENME690 Mechanical Fundamentals of Electronic Systems (3 Credits)
An understanding of the fundamental mechanical principles used in design of electronic devices and their integration into electronic systems will be provided. Focus will be placed on the effect of materials compatibility, thermal stress, mechanical stress, and environmental exposure on product performance, durability and cost. Both electronic devices and package assemblies will be considered. Analysis of package assemblies to understand thermal and mechanical stress effects will be emphasized through student projects.

ENME695 Design for Reliability (3 Credits)
Reliability is the ability of a product or system to perform as intended (i.e., without failure and within specified performance limits) for a specified time, in its life-cycle conditions. Knowledge of reliability concepts and principles, as well as risk assessment, mitigation and management strategies prepares engineers to contribute effectively to product development and life cycle management. This course teaches the fundamental knowledge and skills in reliability as it pertains to the design, manufacture, and use of electrical, mechanical, and electro-mechanical products. Topics cover the suitability of the supply chain members to contribute towards development, manufacturing, distribution and support of reliable products; efficient and cost-effective design and manufacture of reliable products; process capability and process control; derating, uprating, FMMEA, reliability prediction and reliability allocation; how to plan and implement product testing to assess reliability; how to analyze degradation, failure, and return data to estimate fundamental reliability parameters; root cause analysis; and reliability issues associated with warranties, regulatory requirements, and liabilities.

ENME700 Advanced Mechanical Engineering Analysis I (3 Credits)
An advanced, unified approach to the solution of mechanical engineering problems, emphasis is on the formulation and solution of equilibrium, eigenvalue and propagation problems. Review and extension of undergraduate material in applied mathematics with emphasis on problems in heat transfer, vibrations, fluid flow and stress analysis which may be formulated and solved by classical procedures.

ENME701 Sustainable Energy Conversion and the Environment (3 Credits)
Discussion of the major sources and end-uses of energy in our society with particular emphasis on renewable energy production and utilization. Introduces a range innovative technologies and discusses them in the context of the current energy infrastructure. Renewable sources such as wind and solar are discussed in detail. Particular attention is paid to the environmental impact of the various forms of energy.
Recommended: ENME633.
Credit Only Granted for: ENME701, ENME706 or ENME808D.
Formerly: ENME706 and ENME808D.

ENME704 Active Vibration Control (3 Credits)
This course aims at introducing the basic principles of the finite element method and applying it to plain beams and beams treated with piezoelectric actuators & sensors. The basic concepts of structural parameter i dentification are presented with emphasis on Eigensystem Realization Algorithms (ERA) and Auto-regression models (AR). Different active control algorithms are then applied to beams/piezo-actuator systems. Among thes e algorithms are: direct velocity feedback, impedancematchingcontrol, modal control methods & sliding mode controllers. Particular focus is given to feedforward Leat Mean Square (LMS) algorithm & filtered-X LMS. O ptimal placement strategies of sensor & actuators are then introduced & applied to beam/piezo-actuator systems.
Prerequisite: ENME662 and ENME602; or students who have taken courses with comparable content may contact the department.
Recommended: Completion of coursework or background in Vibrations and Control recommended.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering.

ENME707 Combustion and Reacting Flow (3 Credits)
This course covers thermochemistry and chemical kinetics of reacting flows in depth. In particular, we focus on the combustion of hydrocarbonf uels in both a phenomenological and mechanistic approach. The course co vers the specifics of premixed and nonpremixed flame systems, as wellasignition and extinction. Combustion modeling with equilibrium and chemical kinetic methods will be addressed. Environmental impact and emissi ons minimization will be covered in detail. Finally, the course will co ver available combustion diagnostic methods and their application in laboratory and real-world systems.
Prerequisite: ENME331 and ENME332; or students who have taken courses with comparable content may contact the department.

ENME710 Applied Finite Elements (3 Credits)
Application of finite element methods to the solution of engineering problems - such as stress analysis, thermal conductivity, fluid flow anlaysis, electro-magnetic field analysis and coupled boundary value problems. Emphasis is on the application of the techniques to the solution of pr oblems. Basic theory is covered at beginning of course.
Prerequisite: ENME331 and ENME332.
Restriction: Must be in one of the following programs (Engineering: Mechanical; Engineering: Aerospace; Engineering: Civil).

ENME711 Vibration Damping (3 Credits)
This course aims at introducing the different damping models that describe the behavior of viscoelastic materials. Emphasis will be placedon m odeling the dynamics of simple structures (beams, plates & shells) with Passive Constrained Layer Damping (PCLD). Considerations will also be g iven to other types of surface treatments such as Magnetic Constrained Layer Damping (MCLD), Shunted Network Constrained Layer Damping (SNCLD),Active Constrained Layer Damping (ACLD) and Electrorheological Constrained Layer Damping (ECLD). Energy dissipation characteristics of the damp ing treatments will be presented analytically & by using the modal strain energy approach as applied to finite element models of vibrating structures.
Prerequisite: ENME662; or students who have taken courses with comparable content may contact the department.
Recommended: Completion of coursework or background in Vibrations recommended.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering.

ENME712 Measurement, Instrumentation and Data Analysis for Thermo-Fluid Processes (3 Credits)
This course is designed to offer systemic coverage of the methodologies for measurement and data analysis of thermal and fluid processes at the graduate level. The course materials will cover three broad categories: (1) Fundamentals of thermal and fluid processes in single phase and multi phase flows as relates to this course; Measurement and Instrumentation techniques for measurement of basic quantities such as pressure, temperature, flow rate, heat flux, etc., and (3) Experimental Design and Planning, sources of errors in measurements, and uncertainty analysis.

ENME713 Nanoparticle Aerosol Dynamics (3 Credits)
Covers the basic science of nanoparticle formation, growth, and transport; the science and engineering of measurement; and the environmental impact and industrial use of nanoparticles.
Restriction: Permission of instructor. Also offered as: CHEM608.
Credit Only Granted for: ENME713 or ENME808M.
Formerly: ENME808M.

ENME715 Design in Electronic Product Development (3 Credits)
Introduces students to the design methodologies and design tools used to create electronic systems; merges technology, analysis, and design concepts into a methodology for designing an electronic product.
Recommended: ENME473 or ENME690; and knowledge of mathematical program language.
Credit Only Granted for: ENME715 or ENME808Z.
Formerly: ENME808Z.

ENME722 Equilibrium Modeling in Engineering (3 Credits)
Provide motivation and introduction to equilibrium models involving economics and engineering. We will concentrate on models involving markets (Nash-Cournot, etc.), those wherein the activities are spatially diverse, those involving energy activities or traffic flow, as well as selected other examples in mechanical engineering. Areas that will be covered include:Review of relevant optimization theory, presentation of the mixed complementarity problem (MCP) and variational inequality problem (VIP) formats to solve equilibrium problems as well as introduction to existence and uniqueness results, review of relevant game theory notions, presentation of specific models for engineering-economic applications, presentations for algorithms to solve these equilibrium problems.Also offered as: ENCE722.
Credit Only Granted for: ENCE722 or ENME722.

ENME725 Probabilistic Optimization (3 Credits)
Provide an introduction to optimization under uncertainty. Chance-constrained programming, reliability programming, value of information, two stage problems with recourse, decomposition methods, nonlinear and linear programming theory, probability theory. The objectives of this course are to provide understanding for studying problems that involve optimization under uncertainty, learn about various stochastic programming formulations (chance constrained programs, two stage methods with recourse, etc.) relevant to engineering and economic settings, present theory for solutions to such problems, and present algorithms to solve these problems.Also offered as: ENCE725.
Credit Only Granted for: ENME725 or ENCE725.

ENME737 Prognostics and Health Management (3 Credits)
Prognostics and health management (PHM) is an enabling discipline consisting of technologies and
Credit Only Granted for: ENME737 or ENME808A.
Formerly: ENME808A.

ENME740 Lab-on-a-Chip Microsystems (3 Credits)
Fundamentals and application of lab-on-a-chip and microfluidic technologies. A broad view of the field of microfluidics, knowledge of relevant fabrication methods and analysis techniques, and an understanding of the coupled multi-domain phenomena that dominate the physics in these systems.
Credit Only Granted for: ENME 481, ENME 808E, ENME 740.
Formerly: ENME 808E.

ENME741 Operations Research Models in Engineering (3 Credits)
A survey of the fundamentals of operations research models and methods in engineering including: optimization using linear programming, nonlinear programming, integer programming, as well as equilibrium/ game theory via mixed complementarity problems. Examples of specialized course items include: specifics of optimizing power and gas networks, discussion of other network optimization problems, resource-constrained problems, two-level optimization as an example of mixed integer nonlinear programming (MINLP) programming problems as well as algorithms to solve the above types of problems."
Prerequisite: (ENCE302; or (ENME271 and ENME392)); and (MATH140 and MATH240). Or permission of instructor.
Credit Only Granted for: ENME738, ENME741, or ENCE603.
Formerly: ENME738.

ENME742 Urban Microclimate and Energy (3 Credits)
Examines urban microclimate from the perspective of transient heat and mass transfer using building energy simulations for building clusters. The focus is on understandingbuilding energy consumption and environmental impacts from the individual building scale (~100) to a neighborhood scale (~103). Emerging morphological properties of building clustersmodulate transient convective and radiative heat transfer resulting in different localmicroclimatic conditions. At the neighborhood scale, these conditions are analyzed using heatand mass transfer simulations in building clusters to provide boundary conditions for transient building energy simulations. At the individual building scale, besides the energy consumption,this course examines connection between indoor and outdoor environments.Also offered as: ENME424.
Credit Only Granted for: ENME808I, ENME424 or ENME742.
Formerly: ENME808I.

ENME743 Applied Machine Learning for Engineering and Design (3 Credits)
Learn how to apply techniques from Artificial Intelligence and Machine Learning to solve engineering problems and design new products or systems. Design and build a personal or research project that demonstrates how computational learning algorithms can solve difficult tasks in areas you are interested in. Master how to interpret and transfer state-of-the-art techniques from computer science to practical engineering situations and make smart implementation decisions.
Prerequisite: Must have completed undergraduate level Statistics (ENME392 or equivalent), or permission of the instructor.
Credit Only Granted for: ENME440, ENME808E OR ENME743.

ENME744 Additive Manufacturing (3 Credits)
Develop a comprehensive understanding of fundamental additive manufacturing-alternatively, "three-dimensional (3D) printing-approaches, including extrusion-based deposition, stereolithography, powder bed-based melting, and inkjet-based deposition. Cultivate a "design-for-additive manufacturing" skill set for combining computer-aided design (CAD) and computer-aided manufacturing (CAM) methodologies to produce successful 3D prints. Fabricate 3D mechanical objects using a variety of 3D printing technologies on campus. Execute a design project that demonstrates how additive manufacturing technologies can overcome critical limitations of traditional manufacturing processes.
Prerequisite: ENME272 and ENME331; or students who have taken courses with comparable content may contact the department. Also offered as: ENME416.
Credit Only Granted for: ENME 416 OR ENME 744.

ENME745 Numerical Methods in Engineering (3 Credits)
Fundamental aspects of how to apply analytical mathematical concepts to discrete data. The course is aimed at graduate students in any area of engineering, and treats the material in a general manner that is not specific to any application or field of specialization.
Credit Only Granted for: ENME745 and ENME808B.
Formerly: ENME808B.

ENME765 Thermal Issues in Electronic Systems (3 Credits)
This course addresses a range of thermal issues associated with electronic products life cycle. Computational modeling approaches for various levels of system hierarchy. Advanced thermal management concepts including: single phase and phase change liquid immersion, heat pipes, and thermoelectrics.
Prerequisite: ENME331 and ENME332.
Corequisite: ENME473; or students who have taken courses with comparable content may contact the department.

ENME770 Life Cycle Cost and System Sustainment Analysis (3 Credits)
This course melds elements of traditional engineering economics with manufacturing process and sustainment modeling, and life cycle cost management concepts to form a practical foundation for predicting the cost of products and systems. Various manufacturing cost analysis methods will be presented including: process-flow, parametric, cost of ownership, and activity based costing. The effects of learning curves, data uncertainty, test and rework processes, and defects will be considered. Aspects of system sustainment including the impact on the life cycle (and life cycle costs) of reliability, maintenance, environmental impact, and obsolscence will be treated.

ENME775 Manufacturing Technologies for Electronic Systems (3 Credits)
This highly multi-disciplinary course presents the mechanical fundamentals of manufacturing processes used in electronics assemblies. The emphasis is on quantitative modeling of the intrinsic impact that processing has on structure, properties, performance and durability. Students will learn how to quantitatively model many of the key manufacturing steps from mechanistic first principles, so that sensitivity studies and process optimization can be performed in a precise manner. Processes considered include: wafer-level processes such as polishing, lithography, etching and dicing; packaging operations such as die attachment, wirebonding, flip chip bonding, and plastic encapsulation; multilevel high-density substrate fabrication processes; assembly processes such as reflow and wave soldering of surface-mount components to electronic substrates.
Prerequisite: ENME690.

ENME780 Mechanical Design of High Temperature and High Power Electronics (3 Credits)
This course will discuss issues related to silicon power device selection (IGBT, MCT, GTO, etc.), the characteristics of silicon device operation at temperatures greater thatn 125C, and the advantages of devices based on SOI and SiC. It will also discuss passive components and packaging materials selection for distributing and controlling power, focusing on the critical limitations to use of many passive components and packaging materials at elevated temperatures. In addition it will cover packaging techniques and analysis to minimize the temperature elevation caused by power dissipation. Finally, models for failure mechanisms in high temperature and high power electronics will be presented together with a discussion of design options to mitigate their occurrence.
Prerequisite: ENME382, ENME473, or ENME690.

ENME788 Seminar (1-3 Credits)
First or second semester. Credit in accordance with work outlined by mechanical engineering staff.

ENME799 Master's Thesis Research (1-6 Credits)

ENME808 Advanced Topics in Mechanical Engineering (2-3 Credits)

ENME898 Pre-Candidacy Research (1-8 Credits)

ENME899 Doctoral Dissertation Research (1-8 Credits)

ENNU - Engineering, Nuclear

ENNU468 Research (2-3 Credits)
Investigation of a research project under the direction of one of the staff members. Comprehensive reports are required.
Restriction: Permission of instructor; and permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits.

ENNU489 Special Topics in Nuclear Engineering (3 Credits)
Selected topics of current importance in nuclear engineering.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.

ENNU609 Seminar in Nuclear Engineering (1 Credit)

ENNU620 Mathematical Techniques for Engineering Analysis and Modeling (3 Credits)
Probability and probability distributions; statistics; ordinary differential equations; linear algebra and vectors; Laplace transform; Fourier analysis; boundary value problems; series solutions to differential equations; partial differential equations; numerical methods.Also offered as: ENRE620.

ENNU633 Convective Transport Phenomena in Single- and Multi-Phase Systems (3 Credits)
Single medium - single phase systems, two-phase systems; Two media - solid-fluid systems: continuous interface, large interfacial area, fluid-fluid systems; Three media - solid-solid-fluid systems, solid- liquid-gas systems.

ENNU643 Radiation Processing in Advanced Manufacturing (3 Credits)
Radiation processing facilities for industrial production - electron beam, gamma, x-ray; types of electron beam machines; radiation processing - yields, G-values, throughput, efficiency; readiation in advanced manufacturing; radiation sensors and dosimetry; sterilization of industrial products; radiation-physical technology.

ENNU648 Special Problems in Nuclear Engineering (1-16 Credits)

ENNU649 Selected Topics in Nuclear Engineering (1-3 Credits)
Topics of current interest in nuclear engineering.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.

ENNU652 Principles of Reliability Analysis (3 Credits)
Principal methods of reliability analysis, including fault tree and reliability block diagrams; Failure Mode and Effects Analysis (FMEA); event tree construction and evaluation; reliability data collection and analysis; methods of modeling systems for reliability analysis. Focus on problems related to process industries, fossil-fueled power plant availability, and other systems of concern to engineers.
Prerequisite: ENNU651. Also offered as: ENRE602.

ENNU653 Mechanical reliability of Materials (3 Credits)
Introduction to engineering materials; atomic structure; diffusion; defects; phase equilibria; kinetics and microstructures; deformations; fracture; materials testing; fatigue and creep; thermal properties; failure mechanisms; fractography; failure modeling.
Prerequisite: ENNU651.

ENNU655 Radiation Engineering (3 Credits)
An analysis of such radiation applications as synthesizing chemicals, preserving foods, control of industrial processes, design of irradiation installations. E.G., Cobalt 60 gamma ray sources, electronuclear machine arrangement, and chemonuclear reactors.
Restriction: Permission of instructor; and permission of ENGR-Materials Science & Engineering department.

ENNU799 Master's Thesis Research (1-6 Credits)

ENNU898 Pre-Candidacy Research (1-8 Credits)

ENNU899 Doctoral Dissertation Research (1-8 Credits)

ENPM - Engineering, Professional Masters

ENPM600 Probability and Stochastic Processes for Engineers (3 Credits)
Axioms of probability; conditional probability and Bayes' rule; random variables, probability distributions and densities; functions of random variables; definition of stochastic process; stationary processes, correlation functions, and power spectral densities; stochastic processes and linear systems; estimation and optimum filtering. Applications in communication and control systems, signal processing, and detection and estimation.
Prerequisite: Undergraduate introduction to discrete and continuous probability.

ENPM601 Analog and Digital Communication Systems (3 Credits)
Analog modulation methods including AM, DSBSC-AM, SSB, and QAM; effects of noise in analog modulation systems. Digital communication methods for the infinite bandwidth additive white Gaussian noise channel: PAM, QAM, PSK, FSK modulation; optimum receivers using the MAP principle; phase- locked loops; error probabilities. Digital communication over bandlimited channels: intersymbol interference and Nyquist's criterion, adaptive equalizers, symbol clock and carrier recovery systems, trellis coding. Spread spectrum systems: direct sequence modulation and frequency hopping.
Prerequisite: ENPM600; or students who have taken courses with comparable content may contact the department. And permission of ENGR-CDL-Office of Advanced Engineering Education.

ENPM602 Data Networks (3 Credits)
Principles of network design, circuit switching and packet switching, OSI Reference Model; parity and cyclic redundancy check codes; retransmission request protocols; Markov chains and queuing models for delay analysis; multiaccess communication, local area networks, Ethernet and Token Ring standards; routing, flow control, internetworking; higher layer functions and protocols. Software tools for network simulation and performance analysis will be used.
Prerequisite: ENEE324; or students who have taken courses with comparable content may contact the department.

ENPM603 Theory and Applications of Digital Signal Processing (3 Credits)
Uniform sampling and the sampling theorem; the Z-transform and discrete-time system analysis; multi-rate systems; discrete-time random processes; methods for designing FIR and IIR digital filters; effects of quantization and finite work-length; the DFT and FFT; power spectrum estimation.
Prerequisite: Undergraduate introduction to discrete-time systems.

ENPM607 Computer System Design and Architecture (3 Credits)
Principles of computer design and cost/performance factors; instruction set design and implementation, RISC vs. CISC instruction sets; control unit and pipeline design; floating-point arithmetic; memory hierarchy designs, caches, memory interleaving, virtual memory; I/O device interconnections to CPUs and main memory. Additional topics include parallel system designs, SIMD, MIMD, SPMD; interconnection networks for processors and memories; optimization of pipeline operations; superscalar architectures, power management techniques.
Prerequisite: ENEE446; or students who have taken courses with comparable content may contact the department.

ENPM609 Microprocessor-Based Design (3 Credits)
Introduction to microprocessor components, software, and tools. Architectures, instruction sets, and assembly language programming for a commercial microprocessor family. Real-time programming techniques. Peripheral chips such as, parallel ports, counter-timers, DMA controllers, interrupt controllers, and serial communication units. Design projects emphasizing intergrated hardware and software solutions to engineering problems.
Prerequisite: Must have completed undergraduate courses in logic design, computer architecture, and programming.

ENPM610 Digital VLSI Design (3 Credits)
VLSI design with emphasis on CMOS technology. Logic functions using CMOS switches; MOSFET characteristics; BiCMOS, dynamic logic and domino logic structures; PLA's, FPLA's, and gate arrays; layout via MAGIC, use of VHDL, IRSIM, and Spice; design rules and verification techniques; packaging techniques; chip design options: standard cells, sea-of-gates, full custom; design capture and verification tools; design of CMOS datapaths, memory, and control; possible fabrication via MOSIS.
Prerequisite: Must have completed undergraduate courses in solid state devices and digital/analog circuit design.

ENPM611 Software Engineering (3 Credits)
Software engineering concepts, methods, and practices important to both the theorist and the practitioner will be covered. The entire range of responsibilities expected of a software engineer are presented. The fundamental areas of requirements development, software design, programming languages, and testing are covered extensively. Sessions on supporting areas such as systems engineering, project management, and software estimation are also included.
Prerequisite: Competency in one programming language; and must have completed an undergraduate software engineering course. Or permission of instructor.
Restriction: Permission of ENGR-CDL-Office of Advanced Engineering Education.

ENPM612 System and Software Requirements (3 Credits)
Focus will be placed on the theoretical and practical aspects of requirements development. Students will recognize the place of requirements, how to work with users, requirements methods and techniques, the various requirements types, how to set requirements development schedules, requirements evolution, how to model and prototype requirements, how to evaluate and manage risk in requirements, techniques to test requirements, how to manage the requirements process, and how to write an effective requirements document.
Prerequisite: ENPM611.
Restriction: Permission of ENGR-CDL-Office of Advanced Engineering Education.

ENPM613 Software Design & Implementation (3 Credits)
Software design concepts and practices within the field important to both the practitioner and the theorist will be covered. Architectural and detailed designs are included for batch, client/server, and real-time systems. Design considerations for structured, object-oriented, and Web-based systems are covered. Design of databases, user interfaces, forms, and reports are also included. Implementation issues that affect the design, including error handling, performance, and inter-process communication, are presented.
Prerequisite: ENPM611.
Restriction: Permission of ENGR-CDL-Office of Advanced Engineering Education.

ENPM614 Software Testing & Maintenence (3 Credits)
Aspects of software development after coding is completed will be covered. Students will understand the various levels of testing, techniques for creating test data, how to manage test cases and scenarios, testing strategies and methods, testing batch, client/server, real-time, and Internet systems, and the development of an effective test plan. Software maintenance will include the creation of easily maintained software; preventive maintenance, corrective maintenance, and enhancements; configuration management practices; and assuring quality in software manintenance.
Prerequisite: ENPM611.
Restriction: Permission of ENGR-CDL-Office of Advanced Engineering Education.

ENPM615 Embedded Systems (3 Credits)
Introduction to embedded systems design and evaluation: requirements, specification, architecture, hardware and software components, integration and performance evaluation. Topics include instruction sets, CPU, embedded computing platform, program design and analysis, operating systems, hardware accelators, multiprocessors, networks, and system analysis. Real-life embedded systems design examples will be used throughput the course to illustrate these concepts.
Prerequisite: Must have completed undergraduate courses in logic design, computer architecture, and programming.
Credit Only Granted for: ENPM 808C or ENPM 615.
Formerly: ENPM 808C.

ENPM616 Wireless Communications: Concepts and Technologies (3 Credits)
Advanced topics in wireless communications for voice, data, and multimedia. Overview of current wireless systems and standards followed by characterizing the wireless channel, including path loss for different environments, random log-normal shadowing due to signal attenuation, and the flat and frequency-selective properties of multipath fading. Fundamental capacity limits of wireless channels and the characteristics of the capacity-achieving transmission strategies. Overview of wireless networks, including multiple and random access techniques, WLANs, cellular system design, and ad-hoc network design. Applications for these systems, including the evolution of cell phones and PDAs, smart homes and appliances, sensor networks, and automated highways and skyways.
Credit Only Granted for: ENPM 616 or ENPM 808T.
Formerly: ENPM 808T.

ENPM620 Computer Aided Engineering Analysis (3 Credits)
Computer assisted approach to the solution of engineering problems. Review and extension of undergraduate material in applied mathematics including linear algebra, vector calculus, differential equations, and probability and statistics.
Prerequisite: Permission of ENGR-Office of Advanced Engineering Education.
Credit Only Granted for: ENPM620 or ENRE620/ENNU620.

ENPM621 Heat Pump and Refrigeration Systems Design Analysis (3 Credits)
Thermal engineering of heat pump and refrigeration systems and thermal systems modeling. Thermodynamics and heat transfer. Cycle analysis, alternative refrigerants, graphical analysis using property charts. Analysis of applications such as space conditioning, food perservation, manufacturing, heat recovery and cogeneration.

ENPM622 Engergy Conversion I - Stationary Power (3 Credits)
Thermal engineering of modern power generation systems. Cycle analysis of various modern power generation technologies including gas turbine, combined cycle, waste burning and cogeneration. Energy storage and energy transport.

ENPM623 Control of Combustion Generated Air Pollution (3 Credits)
Analysis of the sources and mechanisms of combustion generated air pollution. Air pollution due to internal combustion engines, power generation and industrial emissions. Techniques to minimize and control emission. Acid rain, ozone, plume analysis, scrubbing, filtering.

ENPM624 Renewable Energy Applications (3 Credits)
Thermodynamics and heat transfer of renewable energy sources for heating, power generation and transportation. Wind energy, solar thermal, photovoltaic, biomass, waste burning, and hydropower. Broad overview of the growing use of renewable energy sources in the world economy with detailed analysis of specific applications.
Prerequisite: Knowledge of thermodynamics, fluid mechanics, and heat transfer; and permission of ENGR-Office of Advanced Engineering Education.
Credit Only Granted for: ENPM624 or ENME701.

ENPM625 Heating, Ventilation and Air Conditioning of Buildings (3 Credits)
Low pressure side of buildings heating and cooling systems. Thermodynamics, heat transfer and digital control principles applied to field problems. Quantitative analyses stressed. Topics include psychometrics, thermal loads, incompressible flow in ducts and pipes, heat exchangers, cooling towers, PID control systems.

ENPM626 Waste to Energy Conversion (3 Credits)
Thermal, chemical, and biological processes for conversion of wastes (primarily solid and liquid) to reduce environmental impact and increase recovery of useful energy resources. Emphasis on solid wastes and their composition. Identification of pollution products and their control.
Prerequisite: ENES232, ENME331, and ENME332.

ENPM627 Environmental Risk Analysis (3 Credits)
The fundamental methodology for analyzing environmental risk is described with examples for selected applications. Key elements of the environmental risk methodology include: (1) source term and release characterization, (2) migration of contaminants in various media, (3) exposure assessment, (4) dose-response evaluation, (5) risk characterization, and (6) risk management. Also included will be an introduction to uncertainty analysis and environmental laws and regulations. It is intended to provide students with the basic skills and knowledge needed to manage, evaluate, or perform environmental risk assessments and risk analyses.

ENPM630 Fundamentals of Solid-Propellant Combustion (3 Credits)
Solid propellants are used in a variety of engineering applications, from space and defense (rocket motors, oxygen candles and gun powders) to safety applications (air bags, fire suppression, and emergency oxygen supplies). Both the design of new propellant systems, and the optimization of existing propellants for particular applications, requires knowledge of the complex thermochemical processes involved in the processing, handling, ignition, and combustion of these systems. This course aims to review historical and current developments in this field and provide students with an understanding of the fundamental physics and thermodynamics of solid propellant combustion.
Prerequisite: Previous coursework in combustion.
Credit Only Granted for: ENPM808G or ENPM630.
Formerly: ENPM808G.

ENPM631 TCP/IP Networking (3 Credits)
Describe how IP datagram travels through the internet and are routed from the source to the destination. Introduce the two transport protocols: UDP and TCP, the proper context to use each one, and related parameters and issues. Cover some other protocols, closely related to the TCP/IP that are responsible for the seamless operation of the Internet.
Prerequisite: ENPM602; or permission of instructor. And permission of ENGR-CDL-Office of Advanced Engineering Education.

ENPM632 Advanced TCP/IP Networking (3 Credits)
Introduction to the Socket Interface and network programming, advanced topics in IPv6, internet security, advanced topics in TCP performance, and congestion management, creating a simple web server, mobile IP, IP switching and MPLS, voice over IP and QoS, advanced use of Wireshark (statistics and graphs)
Prerequisite: ENPM631; or permission of instructor. And permission of ENGR-CDL-Office of Advanced Engineering Education.

ENPM635 Thermal Systems Design Analysis (3 Credits)
Evaluates the trade-offs associted with thermal systems. Use of software for system simulation, evaluation and optimization. Applications include power and refrigeration systems, electronics cooling, distillation columns, dehumidifying coils, and co-generation systems.
Credit Only Granted for: ENPM635 or ENME635.

ENPM641 Systems Concepts, Issues, and Processes (3 Credits)
An introduction to the professional and academic aspects of systems engineering. Topics include: systems engineering activities, opportunities and drivers; case studies of systems failures; models of system lifecycle development; introduction to model-based systems engineering; representations for system structure, system behavior, system interfaces and systems intergration; reactive (even-driven) systems, systems-of-systems, measures of system complexity; visual modeling of engineering systems with UML and SysML; simplified procedures for engineering optimization and tradeoff analysis. Software tools for visual modeling of systems with UML and SysML. Students will complete a project for the front-end development of an engineering system using ULM/SysML.
Prerequisite: Permission of ENGR-Office of Advanced Engineering Education. Also offered as: ENSE621.
Credit Only Granted for: ENPM641 or ENSE621.

ENPM642 Systems Requirements, Design and Trade-Off Analysis (3 Credits)
This course builds on material covered in ENSE621/ENPM641, emphasizing the topics of requirements engineering, system-level design and trade-off analysis. Topics include: requirements engineering processes; representation and organization of requirements; implementation and applications of traceability; capabilities of commercial requirements; engineering software; system-level design; design structure matrices; principles of modular design; component- and interface-based design methods; multi-objective optimization-based design and tradeoff; approaches to system redesign in response to changes in requirements, reliability, trade-off analysis,and optimization-based design. Students will complete a project focussing on the development of requirements and their traceability to the system-level design of an engineering system.
Prerequisite: ENPM641 or ENSE621; or permission of ENGR-Office of Advanced Engineering Education. Also offered as: ENSE622.
Credit Only Granted for: ENPM642, ENSE602, or ENSE622.

ENPM643 Systems Projects, Validation and Verification (3 Credits)
This course builds on material covered in ENSE621/ENPM641 and ENSE622/ENPM642. Topics wil cover established and emerging approaches to system validation and verification including; inspection, testing, and traceability; writing validation and verification plans; formal approaches to sytem validation and verification; specification-based testing; role of logic in system validation and verification; automation models of computation, timed automation; model-based design and model checking for reactive systems. Students will be introduced to software tools for specification-based testing, model-based testing, model-based design and model checking. Students will work in teams on semester-long projects in systems engineering design and formal approaches to system validation and verification.
Prerequisite: ENSE622 or ENPM642; and permission of ENGR-Office of Advanced Engineering Education. Also offered as: ENSE623.
Credit Only Granted for: ENPM642 or ENSE623.

ENPM644 Human Factors in Systems Engineering (3 Credits)
This course covers the general principles of human factors, or ergonomics as it is sometimes called. Human Factors (HF) is an interdisciplinary approach for dealing with issues related to people in systems. It focuses on consideration of the characteristics of human beings in the design of systems and devices of all kinds. It is concerned with the assignment of appropriate functions for humans and machines, whether the people serve as operators, maintainers, or users of the system or device. The goal of HF is to achieve compatibility in the design of interactive systems of people, machines, and environments to ensure their effectiveness, safety and ease of use.
Prerequisite: Permission of ENGR-Office of Advanced Engineering Education. Also offered as: ENSE624.
Credit Only Granted for: ENPM644 or ENSE624.

ENPM646 System Life Cycle Cost Analysis and Risk Management (3 Credits)
This course covers topics related to estimating the costs and risks incurred through the lifetimes of projects, products and systems. In addition, treatment is given to methods that determine the drivers of costs and risks and facilitate determination of the most effective alternatives to reducing them. Relevant analytic tools from probability and statistics and important managerial and organizational concepts. Extensive use is made of case studies from industry andgovernment.
Prerequisite: Permission of ENGR-Office of Advanced Engineering Education. Also offered as: ENSE626.
Credit Only Granted for: ENPM646 or ENSE626.

ENPM647 Systems Quality and Robustness Analysis (3 Credits)
This course covers systems engineering approaches for creating optimal and robust engineering systems and for quality assurance. It provides an overview of the important tools for quality analysis and quality management of engineering systems. These tools are commonly used in companies and organizations. Focus is placed on the Baldrige National Quality Program, ISO 9000 certification, six-sigma systems, and Deming total quality management to examine how high quality standards are sustained and customer requirements and satisfactions are ensured. The Taguchi method for robust analysis and design is covered and applied to case studies. Issues of flexible design over the system life cycle are addressed. Statistical process control, international standards for sampling, and design experimentation are also studied.
Prerequisite: Permission of ENGR-Office of Advanced Engineering Education. Also offered as: ENSE627.
Credit Only Granted for: ENPM647 or ENSE627.

ENPM650 Solar Thermal Energy Systems (3 Credits)
Covers a review of related fundamentals, including limitations imposed by thermodynamics, solar spectral characteristics, measurement, and analytical models to predict solar irradiance with respect to time, location and orientation. The course will then examine the characteristics of various components in solar thermal systems with particular emphasis on flat plate and concentrating collectors, fixed and tracking collector systems, heat exchangers and thermal storage to understand how they work and how their performance is influenced by their design. The course will then lead to an examination of systems and system performance, including system design, predicted energy savings and related economics. The course will introduce low temperature applications such as solar hot water, space heating and water distillation, as well as concentrating solar energy for solar thermo-chemical processes to produce hydrogen and solar power generation systems. A project of importance to the development of Solar Thermal Power Systems will be assigned.

ENPM651 Heat Transfer for Modern Application (3 Credits)
The applications selected will vary widely: from cooling of electronics to prevention of fog and stalagmite formation in ice rinks. Multi-mode (i.e. simultaneous conduction, convection, radiation, mass transfer) problems will be emphasized. Lectures on basic principles, followed by assignments in which students formulate solutions and explain results.

ENPM652 Applied Finite Element Methods (3 Credits)
For engineering and science students with little or no previous knowledge of the FEM. Study of FEM, using straightforward mathematics. Students should understand basic concepts and equations of elasticity and thermal heat flow, be familiar with simple matrix algebra. Covers stress analysis and thermal analysis problems. ANSYS finite element code will be used for examples and homework solutions. Basic problem solving procedure will be developed for using finite element computer codes.
Restriction: Must not have completed ENME674; and must not have completed ENAE652.
Credit Only Granted for: ENME674, ENAE652, or ENPM652.

ENPM653 Environmental Law for Engineers and Scientists (3 Credits)
Provide engineers and scientists with a general understanding of the U.S. legal system and key aspects of environmental law. Many engineers and scientists today find that environmental regulatory issues are components of their professional work. This course will familiarize them with the major federal environmental statutes and regulations and some of the compliance issues they may face. The topics of engineers and scientists serving as expert witnesses in lawsuits, preparation of environmental and expert reports, and how technical information is used in the courtroom will also be discussed.

ENPM654 Energy Systems Management (3 Credits)
Covers a wide range of energy management and energy efficiency topics including energy auditing, energy efficient lighting systems and motors, demand limiting and control, control strategies for optimization, direct digital control, integrated building automation systems, communication networks, distributed generation, cogeneration, combined heat and power, process energy management and the associated economic analyses. Included will be the latest internet based technologies for accessing real-time energy pricing and managing energy demand remotely for multiple buildings or campuses.
Recommended: Background in thermodynamics, fluid mechanics, and heat transfer is recommended.

ENPM656 Energy Conversion II -- Mobile Power (3 Credits)
Presents the scientific and engineering basis for design, manufacture, and operation of thermal conversion technologies utilized for mobility power generation. The interface between fuel combustion chemistry and generated power are addressed. The practical aspects of design and operation of various alternatives for power are compared. The impact of choices with regard to power and fuel alternatives as well as air pollution potential are also considered.

ENPM660 Wind Energy Engineering (3 Credits)
An examination of four central topics in wind energy engineering: the nature of wind energy as a resource for generating electricity; the aerodynamics of wind turbines by which the wind energy is converted into mechanical energy; the mechanics and dynamics of the wind energy system (tower, rotor, hub, drive train, and generator); and the electrical aspects of wind turbines. Additional topics to be included in the course include:Wind turbine design; wind turbine control; wind turbine siting, system design, and integration; Wind energy system economics; and wind energy systems environmental impacts and aspects. The course is intended to pass along substantial subject matter knowledge and skills, it can only be treated as an introduction to this extensive, multidisciplinary topic. However, students are expected to emerge with a substantial knowledge of wind energy systems and the methods used to analyze such systems.
Credit Only Granted for: ENPM808Q or ENPM660.
Formerly: ENPM808Q.

ENPM661 Planning for Autonomous Robots (3 Credits)
Planning is a fundamental capability needed to realize autonomous robots. Planning in the context of autonomous robots is carried out at multiple different levels. At the top level, task planning is performed to identify and sequence the tasks needed to meet mission requirements. At the next level, planning is performed to determine a sequence of motion goals that satisfy individual task goals and constraints. Finally, at the lowest level, trajectory planning is performed to determine actuator actions to realize the motion goals. Different algorithms are used to achieve planning at different levels. This graduate course will introduce planning techniques for realizing autonomous robots. In addition to covering traditional motion planning techniques, this course will emphasize the role of physics in the planning process. This course will also discuss how the planning component is integrated with control component. Mobile robots will be used as examples to illustrate the concepts during this course. However, techniques introduced in the course will be equally applicable to robot manipulators.
Credit Only Granted for: ENPM661 or ENPM808C.
Formerly: ENPM808C.

ENPM662 Introduction to Robot Modeling (3 Credits)
This course introduces basic principles for modeling a robot. Most of the course is focused on modeling manipulators based on serial mechanisms. The course begins with a description of the homogenous transformation and rigid motions. It then introduces concepts related to kinematics, inverse kinematics, and Jacobians. This course then introduces Eulerian and Lagrangian Dynamics. Finally, the course concludes by introducing basic principles for modeling manipulators based on parallel mechanisms. The concepts introduced in this course are subsequently utilized in control and planning courses.
Credit Only Granted for: ENPM662 or ENPM808M.
Formerly: ENPM808M.

ENPM667 Control of Robotic Systems (3 Credits)
This is a basic course on the design of controllers for robotic systems. The course starts with mainstay principles of linear control, including a review of elementary concepts of systems, and discusses applications to independent joint control. The second part of the course introduces a physics-based approach to control design that uses energy and optimization principles to tackle the design of controllers that exploit the underlying dynamics of robotic systems. The course ends with an introduction to force control and basic principles of geometric control if time allows.
Credit Only Granted for: ENPM667 or ENPM808Q.
Formerly: ENPM808Q.

ENPM670 Advanced Energy Audit and Conservation (3 Credits)
Students will be provided with current and future trends in energy resources and technologies while providing them with the necessary skills to conduct energy audit/analysis on both commercial and residential facilities. Energy accounting procedures for electrical, mechanical and HVAC systems will be covered in detail, along with economics/life-cycle costing analysis. Fundamental building science principles will be introduced in the context of energy auditing. Students will gain hands on experience conducting an energy audit project through assigned projects. Annual building simulation tools, such as EnergyPlus and eQuest, will be introduced. This is an applied course. Successful completion of this course will equip students with the terminology, knowledge and practical experience necessary to perform energy audits in both residential and commercial buildings.
Prerequisite: Students are expected to have prior knowledge of undergraduate basic thermodynamics, heat transfer, and thermal transport/heat transfer processes. Knowledge of electrical systems and controls is desirable.
Credit Only Granted for: ENPM670 or ENPM808W.
Formerly: ENPM808W.

ENPM671 Advanced Mechanics of Materials (3 Credits)
Formulate and quantitatively state the mechanical/physical responses of structural components and configurations subjected to loads, temperature, pre-strains etc. The two methods of anlysis employed are the mechanics of materials approach and the theory of elasticity approach. Analysis and design of components of structural/machine systems as experienced in aeronautical, civil, mechanical and nuclear engineering.

ENPM672 Fundamentals for Thermal Systems (3 Credits)
Included in this course is an introduction to thermodynamics, fluid mechanics and heat transfer. Emphasis is on gaining an understanding of the physical concepts through the solving of numerical problems associated with simple thermal fluid processes and cycles. Both ideal gases and multiphase fluids will be considered as the working fluids.
Prerequisite: Undergraduate engineering, physics or chemistry degree.
Restriction: Permission of ENGR-Office of Advanced Engineering Education.

ENPM673 Perception for Autonomous Robots (3 Credits)
Image Processing and Computer Vision techniques for Mobile Robots is taught. Three topics are covered: Image Processing (Image Enhancement, Filtering, Advanced Edge and Texture), 3D Vision (3D Geometry from Multiple view geometry, Motion Processing and Stereo) and an Introduction to Image Segmentation and Object Recognition. Students are introduced to a number of existing software toolboxes from Vision and Robotics, and will implement a number of smaller projects in Matlab.
Credit Only Granted for: ENPM673 or ENPM808T.
Formerly: ENPM808T.

ENPM674 Design and Synthesis of Digital Systems (3 Credits)
Students will be introduced to HDL-based design of modern digital systems, and will cover in depth the design and implementation of digital systems using the Verilog HDL. Students will learn fundamental concepts of the Verilog language; modeling of complex digital systems; simulation and verification; and Verilog coding styles for synthesis. Hands-on experience will be developed through practical designs, exercises, and projects. Students will use state-of-the-art EDA tools to design, simulate, and test digital systems. The latter part of the course will focus on customized programmable platforms such as graphics processors (GPUs) multicore platforms and FPGAs as well as coding, building, and debugging for such platforms.
Prerequisite: ENEE140, ENEE150, and ENEE350; or students who have taken courses with comparable content may contact the department.
Recommended: ENEE446.
Credit Only Granted for: ENPM808R or ENPM674.
Formerly: ENPM808R.

ENPM675 Operating System Design (3 Credits)
An overview that covers process management (processes and threads, process scheduling, and process synchronization and communication), memory management (main and virtual), storage management (file and I/O), and protection and security.
Prerequisite: Undergraduate coursework in computer organization and assembly language programming.

ENPM676 VLSI Testing and Design for Testability (3 Credits)
An overview of VLSI test process and equipment, faults, fault modeling, fault simulation, combinational logi ATPG, sequential logic ATPG, Iddq testing, function testing, memory testing, delay testing, design for testability, BIST (Built-In Self-Test) and boundary scan.
Prerequisite: ENEE244; or students who have taken courses with comparable content may contact the department.

ENPM677 Wireless Sensor Networks (3 Credits)
Focuses on networking aspects, protocols and architectures for Wireless Sensor Networks. Provides a thorough description of the most important issues and questions that have to be addressed in a wireless sensor neto work.

ENPM681 Shockwave Physics I (3 Credits)
Covers the history of Shock Wave Physics becoming a scientific discipline, conservation equations for one-dimensional plane steady shocks, Eulerian coordinate system, wave stability conditions, impedance matching technique for design and analysis of experiments, select group of experimental techniques, experimental error analysis, thermodynamics of shock waves including use of consistent equations of state, derivation of plane one dimensional differential conservation laws, and uniqueness of steady wave profiles.

ENPM682 Shockwave Physics II (3 Credits)
Elastic-plastic solids, phase transitions, porous solids, materials with time-dependent properties, detonation waves in Ideal explosives, detonation waves in cylinders of non-ideal explosives, shock initiation of high explosives, experimental techniques for measuring detonation wave properties, Lagrangian coordinate system, ramp wave and raditiaton loading of material.
Prerequisite: ENPM681.

ENPM683 Chemistry of Energetic Materials (3 Credits)
An introduction to the chemistry of energetic materials (explosives, propellants, and pyrotechnics), organized by traditional functional groups. Primary and secondary explosives, including the properities and syntheses of nitrate esters, nitramines, and nitro compounds, as well as other energetic compunds will be discussed. Other topics discussed are: crystallization, polymorphism, sensitivity, and various explosive and propellant compositions.
Recommended: Background in general chemistry is strongly desired.

ENPM684 Rocket Propulsion (3 Credits)
Review of basic rocket propulsion principles including performance, design, analysis, nozzle theory, and thermodynamic relationships. Students will conduct performance analyses of solid, liquid, and hybrid rocket motors. Design projects will be focused to allow students to develop a basic understanding for the challenges associated with the design of chemical rocket engines/motors. We will examine the classification of solid and liquid propellants/fuels/oxidizers and their combustion characteristics.

ENPM685 Security Tools for Information Security (3 Credits)
Students will perform host- and network-based security tasks relating to security, investigation, compliance verification and auditing using a wide selection of commonly used tools on both Windows and Linux platforms, with emphasis on open source tools.
Prerequisite: Familiarity with Linux and Windows operating systems, as well as TCP/IP and basic networking concepts.
Credit Only Granted for: ENPM808D or ENPM685.
Formerly: ENPM808D.

ENPM686 Information Assurance (3 Credits)
The first half of lectures provides an overview of cybersecurity. One third of these lectures focuses on the fundamentals of cybersecurity like authentication, access control, and security models. The second third focuses on the practice of cybersecurity using Unix and Windows NT as case studies. The last third is dedicated to security in distributed systems including network security, and World Wide Web security.
The second half of the lectures focuses on the information assurance process. First, information assets are enumerated and classified. Second, the main vulnerabilities and threats are identified. Third, a risk assessment is conducted by considering the probability and impact of the undesired events. Finally, a risk management plan is developed that includes countermeasures involving mitigating, eliminating, accepting, or transferring the risks, and considers prevention, detection, and response.
Credit Only Granted for: ENPM808E or ENPM686.
Formerly: ENPM808E.

ENPM687 Digital Forensics and Incidence Responses (3 Credits)
Students will implement a robust incident response methodology, including proper forensic handling of evidence, and cover legal aspects of national and international law regarding forensics. The bulk of the course covers evidence acquisition, preservation, analysis and reporting on multiple platforms.
Prerequisite: Experience with both Windows and Unix-based operating systems, including using the command line.
Credit Only Granted for: ENPM808P or ENPM687.
Formerly: ENPM808P.

ENPM693 Network Security (3 Credits)
Introduction to various approaches to design; specify and verify security protocols used in large systems and networks; familiarization with some current technologies. Security threats and countermeasures, communication security and basic encryption techniques, authentication protocols, data confidentiality and integrity, analysis of cryptographic protocols, and access control in large systems and networks.
Prerequisite: An operating systems and/or network protocol course or equivalent.
Formerly: ENPM808N.

ENPM694 Networks and Protocols (3 Credits)
Provides a deep understanding of TCP/IP protocol suit and routing in the internet. The course topics are: overview of TCP/IP, basics of IP protocol, basics of TCP protocol, Network Address Translation (NAT), Dynamic Host Configuration Protocol (DHCP), Internet Protocol Security (IPsec), Internet Control Message Protocol (ICMP), Simple Mail Transfer Protocol (SMTP), Domain Name Service (DNS), IPv6, Concepts of routing (Bellman-Ford and Dijkstra algorithms), Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Interior Gateway Routing Protocol (IGRP), Enhance Gateway Routing Protocol (EIGRP), and Border Gateway Protocol (BGP).
Credit Only Granted for: ENPM694 or ENPM808A.
Formerly: ENPM808A.

ENPM695 Secure Operating Systems (3 Credits)
Operating systems are the basic building block on which programmers build applications and on which security-minded professionals rely, whether they are monitoring activity on a computer, testing applications for security, or determining how malicious code affected their network. This course covers advanced topics in operating systems including process management and communication, remote procedure calls, memory management (including shared memory and virtual memory), checkpointing and recovery, file system, I/O subsystem and device management, distributed file systems and security. The course consists of reading and discussing research papers and includes a course project.
Prerequisite: ENPM691 and CMSC106; or permission of instructor. And permission of ENGR-CDL-Office of Advanced Engineering Education.
Credit Only Granted for: ENPM695 or ENPM808B.
Formerly: ENPM808B.
Additional Information: This course assumes knowledge of C programming and a previous operating systems class or knowledge in various issues such as process management, process synchronization, the critical section problem, CPU scheduling, memory management, secondary storage management.

ENPM696 Reverse Software Engineering (3 Credits)
An in-depth understanding of software reverse engineering concepts and hands-on training with reverse engineering tools, including disassemblers, decompilers, and code analyzers. Students will become familiar with both low-level software and the x86 instruction set through binary reversing sessions. This course also provides insights into many subjects such as system security, source code analysis, software design, and program understanding that will be beneficial in a variety of fields.
Prerequisite: ENPM691 and CMSC106; or permission of instructor. And permission of ENGR-CDL-Office of Advanced Engineering Education.
Credit Only Granted for: ENPM808F or ENPM696.
Formerly: ENPM808F.

ENPM697 Secure Software Testing and Construction (3 Credits)
As software gets more complex, there is even more potential for vulnerabilities to remain in the production version. While traditional and emerging software testing methods are very good at detecting a large majority of "bugs" in the software, modifications to the methods are necessary to ensure vulnerabilities related to security are discovered and mitigated prior to release. In industry, there is also a cost-benefit analysis that determines the limits to pre-release testing, further enforcing the need to uniquely identify security vulnerabilities, potentially prioritizing their correction over other vulnerabilities. This course will cover methods of building security in from the beginning of development and testing the resulting software to ensure security vulnerabilities are detected. The course will use a mixture of textbook principles and research papers to cover the concepts. Students will also complete a course project.
Prerequisite: Permission of instructor; or (ENPM691 and CMSC106). And permission of ENGR-CDL-Office of Advanced Engineering Education.
Credit Only Granted for: ENPM808K or ENPM697.
Formerly: ENPM808K.

ENPM808 Advanced Topics in Engineering (1-3 Credits)
Advanced topics selected by the faculty for students in the professional master of engineering program. May be taken for repeated credit when identified by topic title.

ENPM809 Special Topics in Engineering (3 Credits)
Special topics selected by the faculty for students in the professional master of engineering and graduate certificate in engineering program. May be taken for repeated credit when identified by topic title.
Repeatable to: 30 credits if content differs.

ENPP - Engineering and Public Policy

ENPP610 MEPP Capstone (3 Credits)
MEPP Students, in the last year of their program, will learn case study methods of analysis as they relate to issues of engineering and public policy, through case studies on pressing issues in areas such as environment, national security, biotechnology, energy, infrastructure, development and manufacturing. The course will begin by review of case study methods and analysis. This will be followed by addressing case studies selected by the instructor.
Prerequisite: Permission of ENGR-A. James Clark School of Engineering; and must have completed or be concurrently enrolled in ENCE611.

ENPP611 MEPP Scholarly Practicum (3 Credits)
The scholarly practicum internship for MEPP students is intended to educate students in how engineering and public policy is practised in their MEPP specialization. The internship must last a minimum of 400 hours, and must be completed by the submission and approval of progress and completion reports. By undertaking the internship midway through the student's MEPP studies, the student can make use of MEPP studies completed, and use the experience in selection of subsequent MEPP course to maximize the educational opportunities of the MEPP program.
Restriction: Must have Practicum Proposal approved by MEPP.

ENRE - Reliability Engineering

ENRE447 Fundamentals of Reliability Engineering (3 Credits)
Topics covered include: fundamental understanding of how things fail, probabilistic models to represent failure phenomena, life-models for non-repairable items, reliability data collection and analysis, software reliability models, and human reliability models.
Credit Only Granted for: ENRE445 or ENRE447.
Formerly: ENRE445.

ENRE489 Special Topics in Reliability Engineering (3 Credits)
Selected topics of current importance in reliability engineering.
Prerequisite: Permission of ENGR-Mechanical Engineering department.
Repeatable to: 6 credits if content differs.

ENRE600 Fundamentals of Failure Mechanisms (3 Credits)
Physical, chemical, and thermal related failures are introduced through a basic understanding of degradation mechanisms such as diffusion, electromigration, defects and defect migration. The failure mechanisms in basic material types will be taught. Failure mechanisms observed in real devices will also be presented. Problems related to manufacturing, and achieving quality and reliability will be analyzed. Mechanical failures are emphasized from the point of view of complex fatigue theory. The mathematical and statistical basis for analysis is presented as well as Failure Mode and Failure Anaylsis.
Credit Only Granted for: ENMA698M, ENNU648M, or ENRE600.

ENRE601 Fundamentals of Failure Mechanisms (3 Credits)
Introduces students to basic principles of Reliability Engineering and Reliability Physics. The approach is to provide a general tool set by which engineers can understand how to consider reliability in all phases of the design and manufacture of a product. The emphasis is on integrating statistics and probability with understanding the fundamental physics of processes that lead to failures.

ENRE602 Reliability Analysis (3 Credits)
Principal methods of reliability analysis, including fault tree and reliability block diagrams; Failure Mode and Effects Analysis (FMEA); event tree construction and evaluation; reliability data collection and analysis; methods of modeling systems for reliability analysis. Focus on problems related to process industries, fossil-fueled power plant availability, and other systems of concern to engineers.

ENRE620 Mathematical Techniques of Reliability Engineering (3 Credits)
Basic probability and statistics. Application of selected mathematical techniques to the analysis and solution of reliability engineering problems. Applications of matrices, vectors, tensors, differential equations, integral transforms, and probability methods to a wide range of reliability related problems.Also offered as: ENNU620.

ENRE640 Collection and Analysis of Reliability Data (3 Credits)
Basic life model concepts. Probabilistic life models, for components with both time independent and time dependent loads. Data analysis, parametric and nonparametric estimation of basic time-to-failure distributions. Data analysis for systems. Accelerated life models. Repairable systems modeling.
Prerequisite: ENRE602.

ENRE641 Probabilistic Physics of Failure and Accelerated Testing (3 Credits)
Models for life testing at constant stress. Graphical and analytical methods. Test plans for accelerated testing. Competing failure modes and size effects. Models and data analyses for step and time varying stresses. Optimizing of test plans.
Credit Only Granted for: ENRE641 or ENRE650.
Formerly: ENRE650.

ENRE642 Reliability Engineering Management (3 Credits)
Unifying systems perspective of reliability engineering management. Design, development and management of organizations and reliability programs including: management of systems evaluation and test protocols, development of risk management-mitigation processes, and management of functional tasks performed by reliability engineers.

ENRE645 Human Reliability Analysis (3 Credits)
Methods of solving practical human reliability problems, cognitive and behavioral modeling, task analysis, performance shaping factors, error classification, distribution of human performance and uncertainty bounds, sources of human error probability data, human error risk mitigation, examples and case studies.
Credit Only Granted for: ENRE645 or ENRE734.
Formerly: ENRE734.

ENRE648 Special Problems in Reliability Engineering (1-6 Credits)
For students who have definite plans for individual study of approved problems. Credit given according to extent of work.
Repeatable to: 6 credits if content differs.

ENRE655 Advanced Methods in Reliability Modeling (3 Credits)
Bayesian methods and applications, estimation of rare event frequencies, uncertainty analysis and propagation methods, reliability analysis of dynamic systems, analysis of dependent failures, reliability of repairable systems, human reliability analysis methods and theory of logic diagrams and application to systems reliability.
Prerequisite: ENRE602.
Credit Only Granted for: ENRE655 or ENRE665.
Formerly: ENRE665.

ENRE657 Telecommunications Systems Reliability (3 Credits)
Reliability perspectives in telecommunications networks, comparison of networks with respect to operations and reliability, network relibility modeling techniques, applicable procedural/human reliability models, and network metric objectives and data collection.
Prerequisite: ENRE602.

ENRE664 Electronic Packaging Materials (3 Credits)
Energy bands and carrier concentration, carrier transport phenomena, p-n junction, bipolar devices, unipolar devices, crystal growth and epitaxy, oxidation and film deposition, diffusion and ion implantation, lithography and etching, integrated devices, electomigration.
Prerequisite: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENRE648N or ENRE664.
Formerly: ENRE648N.

ENRE670 Probabilistic Risk Assessment (3 Credits)
Why study risk, sources of risk, overview of Risk Assessment and Risk Management, relation to System Safety and Reliability Engineering; measures, representation, communication, and perception of risk; overview of use of risk assessment results in decision making; overview of Probabilistic Risk Assessment (PRA) process; detailed converge of PRA methods including (1) methods for risk scenario development such as identification of initiators, event sequence diagrams, event trees, causal modeling (fault trees, influence diagrams, and hybrid methods), and simulation approaches; (2) methods of risk scenario likelihood assessment, including quantitative and qualitative approaches, as well as uncertainty modeling and analysis. Also covers methods for risk modeling of system hardware behavior, physical phenomena, human behavior, software behavior, organizational environment, and external physical environment. Additional core topics include risk model integration and quantification (Boolean-based, binary decsion diagram, Bayesian belief networks, and hybrid methods), simulation-based Dynamic PRA methods (discrete and continuous) and several examples of large scale PRAs for space missions, nuclear power, aviation and medical systems.
Prerequisite: ENRE602. Also offered as: ENNU651.
Credit Only Granted for: ENNU651 or ENRE670.

ENRE671 Risk Assessment in Engineering (3 Credits)
Introduction to risk management and decision-making, including uncertainty propagation, importance ranking, risk acceptance criteria, decision analysis and other decsion-making techniques, risk communication.
Prerequisite: ENRE670.
Credit Only Granted for: ENRE648W or ENRE671.
Formerly: ENRE648W.

ENRE682 Software Reliability and Integrity (3 Credits)
Defining software reliability, initiatives and standards on software reliability, inherent characteristics of software which determine reliability, types of software errors, structured design, overview of software reliability models, software fault tree analysis, software redundancy, automating tools for software reliability protypes and real time software reliability.
Credit Only Granted for: ENRE682 or ENRE732.
Formerly: ENRE732.

ENRE684 Information Security (3 Credits)
This course is divided into three major components: overview, detailed concepts and implementation techniques. The topics to be covered are: general security concerns and concepts from both a technical and management point of view, principles of security, architectures, access control and multi-level security, trojan horses, covert channels, trap doors, hardware security mechanism, security models, security kernels, formal specifications and verification, networks and distribution systems and risk analysis.Also offered as: ENME442.
Credit Only Granted for: ENME442, ENRE648J, or ENRE684.
Formerly: ENRE648J.

ENRE689 Special Topics in Engineering Materials (3 Credits)

ENRE730 Bayesian Reliability Analysis (3 Credits)
Foundations of Bayesian statistical inference, Bayesian inference in reliability, performing a Bayesian reliability analysis, Bayesian decision and estimation theory, prior distributions such as non-informative, conjugate, beta, gamma, and negative log gamma, estimation methods based on attribute life test data for estimating failure rates and survival probabilities. System reliability assessment and methods of assigning prior distribution. Empirical Bayes reliability estimates (implicity or explicitly estimated priors).

ENRE770 Life Cycle Cost and System Sustainment Analysis (3 Credits)
This course melds elements of traditional engineering economics with manufacturing process and sustainment modeling, and life cycle cost management concepts to form a practical foundation for predicting the cost of products and systems. Various manufacturing cost analysis will be presented including: process-flow, parametric, cost of ownership, and activity based costing. The effects of learning curves, data uncertainty, test and rework processes, and defects will be considered. Aspects of system sustainment including the impact on the life cycle (and life cycle costs) of reliability, maintenance, environment impact, and obsolescence will be treated.Also offered as: ENME770.
Credit Only Granted for: ENME770 or ENRE770.

ENRE798 Master's Non-Thesis Research (1-6 Credits)

ENRE799 Master's Thesis Research (1-6 Credits)

ENRE898 Pre-Candidacy Research (1-8 Credits)

ENRE899 Doctoral Dissertation Research (1-8 Credits)

ENSE - Systems Engineering

ENSE621 Systems Concepts, Issues, and Processes (3 Credits)
An introduction to the professional and academic aspects of systems engineering. Topics include: systems engineering activities, opportunities and drivers; case studies of systems failures; models of system lifecycle development; introduction to model-based systems engineering; representations for system structure, system behavior, system interfaces and systems intergration; reactive (even-driven) systems, systems-of-systems, measures of system complexity; visual modeling of engineering systems with UML and SysML; simplified procedures for engineering optimization and tradeoff analysis. Software tools for visual modeling of systems with UML and SysML. Students will complete a project for the front-end development of an engineering system using ULM/SysML.
Restriction: Permission of ENGR-Institute for Systems Research. Also offered as: ENPM641.
Credit Only Granted for: ENPM641 or ENSE621.

ENSE622 Systems Requirements, Design and Trade-Off Analysis (3 Credits)
This course builds on material covered in ENSE621/ENPM641, emphasizing the topics of requirements engineering, system-level design and trade-off analysis. Topics include: requirements engineering processes; representation and organization of requirements; implementation and applications of traceability; capabilities of commercial requirements; engineering software; system-level design; design structure matrices; principles of modular design; component- and interface-based design methods; multi-objective optimization-based design and tradeoff; approaches to system redesign in response to changes in requirements, reliability, trade-off analysis,and optimization-based design. Students will complete a project focussing on the development of requirements and their traceability to the system-level design of an engineering system.
Prerequisite: ENPM641 and ENSE621; or permission of ENGR-Institute for Systems Research. Also offered as: ENPM642.
Credit Only Granted for: ENPM642 or ENSE622.

ENSE623 Systems Projects, Validation and Verification (3 Credits)
This course builds on material covered in ENSE621/ENPM641 and ENSE622/ENPM642. Topics wil cover established and emerging approaches to system validation and verification including; inspection, testing, and traceability; writing validation and verification plans; formal approaches to sytem validation and verification; specification-based testing; role of logic in system validation and verification; automation models of computation, timed automation; model-based design and model checking for reactive systems. Students will be introduced to software tools for specification-based testing, model-based testing, model-based design and model checking. Students will work in teams on semester-long projects in systems engineering design and formal approaches to system validation and verification.
Prerequisite: ENSE622 and ENPM642; and permission of ENGR-Institute for Systems Research. Also offered as: ENPM643.
Credit Only Granted for: ENPM643, ENSE610, or ENSE623.

ENSE624 Human Factors in Systems Engineering (3 Credits)
This course covers the general principles of human factors, or ergonomics as it is sometimes called. Human Factors (HF) is an interdisciplinary approach for dealing with issues related to people in systems. It focuses on consideration of the characteristics of human beings in the design of systems and devices of all kinds. It is concerned with the assignment of appropriate functions for humans and machines, whether the people serve as operators, maintainers, or users of the system or device. The goal of HF is to achieve compatibility in the design of interactive systems of people, machines, and environments to ensure their effectiveness, safety and ease of use.
Restriction: Permission of ENGR-Institute for Systems Research. Also offered as: ENPM644.
Credit Only Granted for: ENPM644 or ENSE624.

ENSE626 System Life Cycle Analysis and Risk Management (3 Credits)
This course covers topics related to estimating the costs and risks incurred through the lifetimes of projects, products and systems. In addition, treatment is given to methods that determine the drivers of costs and risks and facilitate determination of the most effective alternatives to reducing them. Also covered, are relevant analytic tools from probability and statistics and also important managerial and organizational concepts. Extensive use is made of case studies and examples from industry and government.
Prerequisite: Permission of ENGR-Institute for Systems Research. Also offered as: ENPM646.

ENSE627 Systems Quality and Robustness Analysis (3 Credits)
This course covers systems engineering approaches for creating optimal and robust engineering systems and for quality assurance. It provides an overview of the important tools for quality analysis and quality management of engineering systems. These tools are commonly used in companies and organizations. Focus is placed on the Baldrige National Quality Program, ISO 9000 certification, six-sigma systems, and Deming total quality management to examine how high quality standards are sustained and customer requirements and satisfactions are ensured. The Taguchi method for robust analysis and design is covered and applied to case studies. Issues of flexible design over the system life cycle are addressed. Statistical process control, international standards for sampling, and design experimentation are also studied.
Restriction: Permission of ENGR-Institute for Systems Research. Also offered as: ENPM647.
Credit Only Granted for: ENPM647 or ENSE627.

ENSE698 Special Topics in Systems Engineering (3 Credits)

ENSE699 Directed Study in Systems Engineering (1-3 Credits)
Directed study in Systems Engineering.
Prerequisite: ENSE621, ENSE622, and ENSE623.
Repeatable to: 3 credits if content differs.

ENSE799 Systems Engineering Thesis (1-6 Credits)
The application of systems engineering concepts, principles, and theories will be applied to the Master's Thesis project. Project/thesis work will be defined and selected early in student's program and supervised by a university faculty mentor.
Prerequisite: Permission of ENGR-Institute for Systems Research; and ENSE621; and must have 6 additional credits totaling 9 credit hours.
Repeatable to: 6 credits.

ENSP - Environmental Science and Policy

ENSP400 Capstone in Environmental Science and Policy (3 Credits)
Integration of physical, biological, and social sciences with applications to environmental science and policy. Problem-solving and multi-disciplinary case study evaluations pertinent to contemporary and future issues related to the environment.
Prerequisite: ENSP101; and ENSP102.
Restriction: Senior standing; or permission of the Director of ENSP. And must be in Environmental Science and Policy program.

ENSP489 Special Topics in Environmental Science and Policy (1-3 Credits)
A lecture and or laboratory series organized to study a selected phase of Environmental Science and Policy not covered by existing courses. Credit according to time scheduled and organization of the course.
Repeatable to: 6 credits if content differs.

ENSP499 Honors Thesis Research (1-6 Credits)
Individual research, thesis, and oral defense. The research project will be conducted under the supervision of a faculty member.
Restriction: Must be in the ENSP Honors program; and permission of AGNR-Dean-Environmental Science & Policy Program.
Repeatable to: 6 credits.

ENSP699 Special Topics in Environmental Science and Policy (1-6 Credits)
Independent study course.
Prerequisite: Permission of AGNR-Dean-Environmental Science & Policy Program.
Restriction: Permission of instructor; and permission of AGNR-Dean-Environmental Science & Policy Program.
Repeatable to: 6 credits.

ENST - Environmental Science and Technology

ENST403 Invasive Species Ecology (3 Credits)
We will examine ecological, evolutionary, and anthropogenic processes facilitating or resisting biological invasions, and consider their environmental, economic, and human health impacts. We will consider various management strategies to mitigate invasions and identify areas of future research. Field trips and detailed discussion of recent findings and controversies in the literature will help illustrate fundamental concepts of invasions among various ecosystems.
Credit Only Granted for: ENST403, ENST603, or ENST689R.

ENST404 Ecological and Natural Resources Ethics (3 Credits)
Bridges science and management with ethical theory and concepts to help scientists, regulators, and managers understand how to deal with potential ethical dilemmas that arise in natural resource and environmental management implementation and policy development.
Prerequisite: ENST214 and ENST360.
Recommended: ENST314, ENST410, and ENST460.
Restriction: Senior standing or higher. Also offered as: ENST604.
Credit Only Granted for: ENST604 or ENST404.

ENST405 Energy and Environment (3 Credits)
Introduction to the role of energy in environmental and human-dominated systems. Discussion of the historical and modern production and consumption of energy. Introduction to energy systems computer simulation and energy auditing.
Prerequisite: MATH140 or MATH120; or must have completed MATH220.
Restriction: Junior standing or higher. And must be in Environmental Sci & Tech program; or must be in Environmental Sci & Tech: Ecological Tech Design program; or must be in Environmental Sci & Tech: Environmental Health program; or must be in Environmental Sci & Tech: Soil & Watershed Science program; or must be in Environmental Sci & Tech: Natural Resources Mgmt program. Also offered as: ENST605.
Credit Only Granted for: ENST405, ENSP350, ENST605, NRMT489Z, or MEES698Z.
Formerly: NRMT489Z.

ENST406 Applied Forestry Practices (3 Credits)
Focuses on the applied dynamics of a set of forest practices such as management, silviculture, measurement and inventory, preparation of a management plan, etc, within the urban/rural interface. Several field trips are included to gain hands-on experience.
Prerequisite: ENST200. And ENST360; or PLSC471. Also offered as: PLSC475.
Credit Only Granted for: ENST406 or PLSC475.

ENST410 Ecosystem Services: An Integrated Analysis (3 Credits)
The importance of our ecosystems and the services they provide will be discussed. Basic principles used to analyze ecosystem services will be discussed and applied using case studies & field exercises. Forestland, wetlands and our marine resources are increasingly recognized for their ecosystem services provided to society, to include clean air and water, wildlife habitat, biodiversity, carbon storage and pollination services. This course will prepare students to deal with the complex issues involved in understanding those and other ecosystem services and their importance to society and environmental sustainability. Slowly, new markets are emerging for these services. Students will analyze the ecological, policy and financial dimensions of enhancing, restoring, and sustaining ecosystem services. New and on-going government programs and private business ventures will be discussed.
Prerequisite: ENST360 or BSCI361; or permission of instructor.
Restriction: Must be in one of the following programs (Environmental Sci & Tech: Ecological Tech Design; Environmental Sci & Tech; Environmental Sci & Tech: Natural Resources Mgmt; Environmental Sci & Tech: Soil & Watershed Science; Environmental Sci & Tech: Environmental Health).

ENST411 Principles of Soil Fertility (3 Credits)
Soil factors affecting plant growth and quality with emphasis on the bio-availability of mineral nutrients. The management of soil systems to enhance plant growth by means of crop rotations, microbial activities, and use of organic and inorganic amendments.
Prerequisite: ENST200; or students who have taken courses with comparable content may contact the department. Also offered as: ENST611.
Credit Only Granted for: ENST411 or NRSC411.
Formerly: NRSC411.

ENST414 Soil Morphology, Genesis and Classification (4 Credits)
Processes and factors of soil genesis. Taxonomy of soils of the world by U.S. System. Soil morphological characteristics, composition, classification, survey and field trips to examine and describe soils.
Prerequisite: ENST200.
Credit Only Granted for: ENST414 or NRSC414.
Formerly: NRSC414.

ENST415 Renewable Energy (3 Credits)
An overview of renewable energy technologies and their current applications. Emphasis will be placed on technological readiness, efficiency and sustainability of renewable energy alternatives. Technologies include solar thermal, photovoltaics, biodiesel, ethanol, anaerobic digestion, wind, hydroelectric, and microbial fuel cells.
Prerequisite: CHEM131, PHYS121, and MATH113; or permission of AGNR-Environmental Science & Technology department.
Restriction: Must be in a major within AGNR-Environmental Science & Technology department.

ENST417 Soil Physics and Hydrology (3 Credits)
A study of soil water interactions: the hydrologic cycle; the unique properties of water and soil; the soil components and their interactions; the field water cycle; transport processes involving water, heat and solutes; human effects on soil and groundwater; as well as the measurement, prediction, and control of the physical processes taking place in and through the soil.
Prerequisite: ENST200; and (MATH113 or MATH115). Or permission of instructor.
Credit Only Granted for: ENST417 or NRSC417.
Formerly: NRSC417.

ENST421 Soil Chemistry (4 Credits)
The chemistry and composition of mineral and organic colloids in soils, including ion exchange, oxidation-reduction, acidity, surface charge, and solution chemistry. Lectures and readings pertain to plant nutrition, waste disposal, and groundwater quality.
Prerequisite: ENST200.
Credit Only Granted for: ENST421 or NRSC421.
Formerly: NRSC421.

ENST422 Soil Microbial Ecology (3 Credits)
The interdisciplinary study of soil microorganisms and their interactions with the mineral matrix; resulting in processes such as nutrient cycling, decontamination, and natural product production. We will focus on the diversity of soil communities, their survival strategies, and the new strategies used to study these communities.
Prerequisite: ENST200; or 1 course in BCHM; or must have completed a course in microbiology; or students who have taken courses with comparable content may contact the department. Also offered as: ENST622.
Credit Only Granted for: ENST422 or NRSC422.
Formerly: NRSC422.

ENST423 Soil-Water Pollution (3 Credits)
Reaction and fate of pesticides, agricultural fertilizers, industrial and animal wastes in soil and water with emphasis on their relation to the environment.
Prerequisite: CHEM104 and ENST200; and permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST423 or NRSC423.

ENST424 Field Study in Soil Morphology (4 Credits)
The fundamentals of making morphological descriptions of soils, using standard techniques, terminology, and abbreviations of the National Cooperative Soil Survey. Given a regional perspective and reasonable assumptions regarding soil properties, students should become competent to classify soils which they have described in the field and also make interpretations concerning the suitability of soils for various potential uses.
Prerequisite: ENST200.
Credit Only Granted for: ENST424 or NRSC424.
Formerly: NRSC424.
Additional Information: Students must pay a $300 course activities fee.

ENST430 Wetland Soils (3 Credits)
The soils of wetlands including hydrology, chemistry, and genesis are discussed. Federal and regional guidelines for wetland soils are covered with an emphasis on validating interpretations through field observations.
Prerequisite: ENST200.
Credit Only Granted for: ENST430, ENST630, or NRSC461.
Formerly: NRSC461.

ENST432 Environmental Microbiology (3 Credits)
Microorganisms are everywhere and mediate many of the processes that we observe everyday. These organisms are the unseen catalysts for numerous industrial processes and are critical to many emerging technologies and novel products. Environmental microbiologists ask: How do microorganisms in the environment benefit society? This course will answer this question by examining microbes in bioremediation, food safety, climate change, and biotechnology.
Prerequisite: CHEM131 and CHEM132. And BSCI170 and BSCI171; or BSCI105.
Credit Only Granted for: ENST432 or ENST499M.
Formerly: ENST499M.

ENST434 Toxic Contaminants: Sources, Fate, and Effects (3 Credits)
Study of the release to the environment, transport through natural compartments, persistence and ultimate fate of various classes of contaminants produced as a result of human activities. Topics will culminate in discussions of impacts to wildlife and human health. Students should emerge with a practical appreciation of the actual risks from exposure to a variety of environmental contaminants and an understanding of the environmental and human health implications of continuing the contaminating activities.
Prerequisite: ENST333 and ENST334.

ENST436 Emerging Environmental Threats (3 Credits)
Examine new and potential environmental concerns in the air, water, soil, space, and the built environment. Emphasis on studying the intrinsic links between ecosystem and human health. Topics will include climate change, resource consumption, biodiversity change, infectious disease, non-traditional pollutants, and other complex and significant environmental concerns.
Prerequisite: ENST233; or permission of AGNR-Environmental Science & Technology department.

ENST440 Crops, Soils and Civilization (3 Credits)
Role and importance of crop and soil resources in the development of human civilization. History of crop and soil use and management as they relate to the persistence of ancient and modern cultures.
Credit Only Granted for: ENST440 or NRSC440.
Formerly: NRSC440.

ENST441 Sustainable Agriculture (3 Credits)
Environmental, social and economic needs for alternatives to the conventional, high-input farming systems which currently predominate in industrial countries. Strategies and practices that minimize the use of non-renewable resources.
Credit Only Granted for: ENST441 or NRSC441.
Formerly: NRSC441.

ENST443 Industrial Ecology (3 Credits)
Problems of waste management and recycling in human societies are covered. The industrial ecology approach to design is contrasted with analogous patterns and processes from natural ecosystems.
Prerequisite: (MATH140 or MATH120; or must have completed MATH220); and BSCI361. Or permission of AGNR-Environmental Science & Technology department. Also offered as: ENST643.
Credit Only Granted for: ENST443, ENST643, or MEES698J.

ENST445 Ecological Risk Assessment (3 Credits)
Assessment of ecological impacts of perturbations on natural systems. Course will describe quantitative methods for estimating environmental impacts by extrapolating from laboratory and field data. The role of regulatory agencies and implications of scientific uncertainty on risk management will be covered.
Prerequisite: ENST360 or BSCI361; and (BIOM301 and ENST334). Or permission of AGNR-Environmental Science & Technology department.

ENST450 Wetland Ecology (3 Credits)
Plant and animal communities, biogeochemistry, and ecosystem properties of wetlands. Lectures are supplemented by weekend or Friday field trips (1-3 days total during the semester) and in-class labs that emphasize collection and analysis of field data on wetland vegetation, soil, and hydrology. Wading boots (at least hip length) are strongly recommended.
Prerequisite: BIOM301; or permission of AGNR-Environmental Science & Technology department. Also offered as: ENST650.
Credit Only Granted for: ENST450, NRMT450, or MEES650.
Formerly: NRMT450.

ENST452 Wetland Restoration (3 Credits)
Design, construction, and evaluation of wetlands restored or created to provide ecosystem services or to mitigate losses due to development. Topics include fundamental properties of wetlands, ecological restoration theory, site selection and goal-setting, design plans, practices for establishing wetland hydrology, substrate, and vegetation, and restored ecosystem monitoring. Two mandatory Saturday field trips will be held (dates to be announced); waterproof boots or waders are recommended for field trips.
Prerequisite: (BSCI160 and BSCI161; or BSCI106); and (BSCI362, ENST450, ENST360, or BSCI361). Or permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST452, ENST652, or MEES652.

ENST453 Watershed Science: Water Balance, Open Channel Flow, and Near Surface Hydrology (3 Credits)
Concepts of surface water balance, surface radiative flux, precipitation and evaporation measurements.
Credit Only Granted for: ENST453 or ENST653.

ENST460 Principles of Wildlife Management (3 Credits)
Ecological principles and requirements of wildlife as basis for management, and introduction to the scientific literature. Conflicts in wildlife management, government administration of wildlife resources, legislation, and history of the wildlife management profession.
Prerequisite: Must have completed two semesters of biology laboratory; and (ENST360; or BSCI361). Or permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST460 or NRMT460.
Formerly: NRMT460.

ENST461 Urban Wildlife Management (3 Credits)
Ecology and management of wildlife in urban areas. For students in biological sciences, geography, landscape design, natural resources management, recreation and urban studies. Planning, design, and wildlife conservation in landscape ecology. Public attitudes, preferences, and values, review of private conservation organizations.
Credit Only Granted for: ENST461 or NRMT461.
Formerly: NRMT461.

ENST462 Field Techniques in Wildlife Management (3 Credits)
Hands-on experience with field techniques in wildlife management focusing on various methods of conducting indices, estimates, and censuses of wildlife populations. Includes capture and handling of amphibians, reptiles, birds, and mammals by use of drift fences, cover boards, mist nets, box traps, and dart guns.
Prerequisite: ENST460. And BSCI160 and BSCI161; or BSCI106. And BSCI170 and BSCI171; or BSCI105.
Recommended: ENST461.
Restriction: Permission of AGNR-College of Agriculture & Natural Resources.
Credit Only Granted for: ENST462, NRMT462, or NRMT489B.
Formerly: NRMT462.

ENST463 Wildlife Habitat and Population Modeling (3 Credits)
Students will gain basic tools for the analysis and modeling of wildlife population demographics and wildlife habitat. This class will be broken into two components: 1) will teach students techniques of modeling wildlife field data for the purpose of estimation of key parameters such as population size, viability, and other demographic rates using programs such as Riskman, Vortex, and Mark; 2) will teach students real world techniques used to determine and model habitat use on multiple scales using statistical analyses, GIS, and stand-alone programs such as Home Ranger and Biomapper. This class is designed for wildlife and natural resources majors.
Prerequisite: ENST460 and GEOG373; and (MATH120; or must have completed MATH220). Or permission of AGNR-Environmental Science & Technology department.
Restriction: Must be in Environmental Sci & Tech program; and must be in Environmental Science and Policy program.

ENST466 Ecology and Management of Wildlife Habitats (3 Credits)
Introduction to general concepts of wildlife habitat ecology and management. Specifically,land use practices on public and private lands and how these practices influence wildlife production. Conduct wildlife habitat evaluations and options for alterations/manipulations to achieve specific management goals. The class will culminate with the creation and planning of a wildlife management plan.
Recommended: ENST460.

ENST467 Ecology and Management of Wildlife Habitats Lab (2 Credits)
An introduction to the principles of wildlife habitat data analysis applied at the population level. This class will teach students real world techniques used to determine and model habitat use on multiple scales. This lab course complements the material covered in ENST 466.
Corequisite: ENST466.

ENST471 Captsone I (2 Credits)
This course will be conducted in a group discussion format that will focus on professional project proposal preparation and presentation, critical evaluation of environmental science research, professional development, and career planning. Students will develop and present original project proposals and critique project proposals presented by others.

ENST472 Capstone II (3 Credits)
This course is the second in a two-part series. Students will continue work on projects proposed and begun in ENST471. Focus on professional project preparation, presentation, critical evaluation on environmental science research, professional development, and career planning. Students will develop and present original projects and critique projects presented by others.
Prerequisite: ENST471.
Restriction: Must be in a major within AGNR-Environmental Science & Technology department; and permission of AGNR-Environmental Science & Technology department.

ENST479 Tropical Ecology and Resource Management (1-6 Credits)
Tropical ecosystems and issues of human use and impact. Includes lectures which lead up to an off-campus trip in a tropical environment.
Prerequisite: Must have completed an introductory economics course. And BSCI160 and BSCI161; or BSCI106.
Restriction: Permission of instructor.
Repeatable to: 10 credits if content differs.
Formerly: NRMT479.

ENST481 Ecological Design (4 Credits)
An advanced survey course on the field of ecological design. Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development. Concepts covered include ecology, ecological engineering, nutrient cycling, emergy, lifecycle analysis, and design process. Technologies include treatment wetlands, living machines, anaerobic digestion, rain gardens, bioswales, bioremediation, algal turf scrubbers, and green building design.
Prerequisite: (MATH120 or MATH140; or must have completed MATH220); and (PHYS121 and CHEM131); and (BSCI361; or students who have taken courses with comparable content may contact the department). Or permission of instructor.
Restriction: Permission of AGNR-Environmental Science & Technology department. Also offered as: MEES681.
Credit Only Granted for: ENST481, ENST681, or MEES681.

ENST485 Water Management in Urban Environment (3 Credits)
Historically, with the exception of certain locations, water has been available in sufficient quantities, and providing supporting infrastructure has been relatively straightforward. In urban areas, the concentration of people and the drastic changes in land use, have altered the fluxes of water, sediments, chemicals, and microorganisms. As the population increases and the number of large urban areas keeps growing (both in U.S. and internationally), managing water in urban areas is becoming more challenging. Water must be supplied for domestic, commercial, and industrial use, as well as irrigation and maintaining and enhancing local environments (e.g., urban streams). In addition, stormwater must be managed to prevent flooding and environmental damage, and used water, which contains organic matter, nutrients, and other constituents that can be extracted and reused, must be collected and managed. In this course we take a systems approach to urban water hydrology, engineering, planning and management. We will explore urban water cycle, urban runoff and drainage characteristics, urban water supply and demand, stormwater collection and treatment and designing best management practices. Additionally, we look at the climate impacts on the urban water cycle.
Prerequisite: MATH120, MATH130, MATH136, or MATH140.
Credit Only Granted for: ENST485 OR ENST489Z.
Formerly: ENST489Z.

ENST487 Environmental Conflicts and Decision Making (2 Credits)
Study major cases which focus on environmental science with concentration on the role and techniques of negotiation, collaborative decision making, and adaptive resource management as an environmental conflict resolution process.
Restriction: Senior standing. And must be in one of the following programs (Environmental Sci & Tech: Natural Resources Mgmt; Environmental Sci&Pol-Wildlife Ecology & Mgmt) ; or permission of AGNR-Environmental Science & Technology department.

ENST489 Research Experience (3 Credits)
An advanced research-based course in the field of environmental science and technology.
Restriction: Permission of AGNR-Environmental Science & Technology department.
Repeatable to: 6 credits.
Formerly: NRMT489.

ENST499 Special Topics in Environmental Science and Technology (1-4 Credits)
An independent study, and/or lecture, and/or laboratory series organized to study a selected phase of Environmental Science and Technology not covered by existing courses. Credit arranged with supervising faculty member.
Restriction: Permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST499, NRMT499, or NRSC499.
Formerly: NRSC499 and NRMT499.

ENST602 Research Principles and Methodology in Environmental Scienceand Technolgy (3 Credits)
Fundamental research strategies and methods of investigation in Environmental Science and Technology including field and laboratory procedures.
Restriction: Must be in Environmental Sci & Tech program.

ENST603 Advanced Species Ecology (3 Credits)
We will examine ecological, evolutionary, and anthropogenic processes facilitating or resisting biological invasions, and consider their environmental, economic, and human health impacts. We will consider various management strategies to mitigate invasions and identify areas of future research. Field trips and detailed discussion of recent findings and controversies in the literature will help illustrate fundamental concepts of invasions among various ecosystems.Also offered as: ENST403.
Credit Only Granted for: ENST403, ENST603, or ENST689R.
Formerly: ENST689R.
Additional Information: Two field trips are planned for this class.

ENST604 Advanced Ecological and Natural Resource Ethics (3 Credits)
Bridges science and management with ethical theory and concepts to help scientists, regulators, and managers understand how to deal with potential ethical dilemmas that arise in natural resource and environmental management implementation and policy development.
Prerequisite: ENST214 and ENST360.
Recommended: ENST314, ENST410, and ENST460.
Credit Only Granted for: ENST404 or ENST604.

ENST605 Energy and Environment (3 Credits)
Role of energy in environmental and human-dominated systems and their linkage. Discussion of the historical and modern production and consumption of energy. Energy systems simulation modeling, energy analysis and energy auditing. Review of national energy policies and proposed alternatives.
Prerequisite: MATH120; or must have completed MATH220; or students who have taken courses with comparable content may contact the department. Also offered as: ENST405.
Credit Only Granted for: ENST405, ENST605, or MEES698Z.
Formerly: MEES698Z.

ENST608 Research Methods (1-4 Credits)
Development of research viewpoint by detailed study and report on crop and soil research of the Maryland Agriculture Experiment Station or review and discussion of literature on specific agricultural problems or new research techniques.
Restriction: Permission of AGNR-Environmental Science & Technology department.
Repeatable to: 4 credits if content differs.
Credit Only Granted for: ENST608 or NRSC608.
Formerly: NRSC608.

ENST611 Advanced Principles of Soil Fertility (3 Credits)
Soil factors affecting plant growth and quality with emphasis on the bio-availability of mineral nutrients. The management of soil systems to enhance plant growth by means of crop rotations, microbial activities, and use of organic and inorganic amendments.
Prerequisite: ENST200; or students who have taken courses with comparable content may contact the department. Also offered as: ENST411.
Credit Only Granted for: ENST411, NRSC411, or ENST611.

ENST622 Advanced Soil Microbial Ecology (3 Credits)
The interdisciplinary study of soil microorganisms and their interactions with the mineral matrix; resulting in processes such as nutrient cycling, decontamination, and natural product production. We will focus on the diversity of soil communities, their survival strategies, and the new strategies used to study these communities.The course will include an examination of current literature in this field.
Prerequisite: ENST200; or 1 course in BCHM; or must have completed one course in microbiology; or students who have taken courses with comparable content may contact the department. Also offered as: ENST422.
Credit Only Granted for: ENST422 or ENST622.

ENST630 Advanced Wetland Soils (3 Credits)
The soils of wetlands including hydrology, biogeochemistry, and pedogenesis, including a focused discussion of current literature. Federal and regional guidelines for wetland soils are covered with an emphasis on validating interpretations through field observations.
Prerequisite: ENST200.
Credit Only Granted for: ENST630, ENST430, or NRSC461.

ENST640 Advanced Crops, Soils, and Civilization (3 Credits)
Explore the rise, cycling, resilience, and decline of civilizations and apply learning to modern issues in the fields of sustainability, environmental ethics, natural resource management, and agriculture. Role and importance of crop and soil resources in the development of human civilization. History of crop and soil use and management as they relate to the persistence of ancient and modern cultures.Also offered as: ENST440.
Credit Only Granted for: ENST440 or ENST640.

ENST643 Advanced Industrial Ecology (3 Credits)
Problems of waste management and recycling in human societies are covered. The industrial ecology approach to design is contrasted with analogous patterns and processes from natural ecosystems.
Prerequisite: BSCI361; and permission of AGNR-Environmental Science & Technology department. Also offered as: ENST443.
Credit Only Granted for: ENST443 or ENST643.

ENST647 Advanced Biodiversity, Ecology, and Human Health (3 Credits)
An investigation of how biodiversity and ecological processes affect human health. Humans as integral but unique members of ecosystems whose well-being depends on a range of complex ecological services will be viewed. Topics will include human-induced environmental changes, species invasions, species interactions, medicines from nature, and infectious diseases. Students will lead class discussion of peer-reviewed literature and complete an assignment writing a research grant proposal. The lab will involve researching native and introduced species of medical importance.
Prerequisite: BSCI361; or permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST447, ENST647, or MEES647.

ENST650 Advanced Wetland Ecology (3 Credits)
Plant and animal communities, biogeochemistry, and ecosystem properties of wetland systems. In-class laboratory will emphasize collection and analysis of field data on wetland vegetation, soil, and hydrology.
Prerequisite: BIOM301; or permission of AGNR-Environmental Science & Technology department. Also offered as: ENST450, MEES650.
Credit Only Granted for: ENST450, ENST650, or MEES650.
Additional Information: Wading boots (at least hip length) are strongly recommended.

ENST652 Advanced Wetland Creation and Restoration (3 Credits)
Design, construction, and evaluation of wetlands restored or created for ecosystem enhancement or mitigation. Topics will include ecological restoration theory, goal-setting, practices for establishing wetland hydrology, substrate, and vegetation, and restored ecosystem monitoring and functional assessment.
Prerequisite: BSCI106. And BSCI362, ENST450, or MEES650; or permission of AGNR-Environmental Science & Technology department. Also offered as: ENST452, MEES652.
Credit Only Granted for: ENST452, ENST652 or MEES652.
Additional Information: Two mandatory Friday afternoon field trips will be held from 1:00 - 6:00; hip length wading boots are recommended for field trips.

ENST681 Advanced Ecological Design (4 Credits)
An advanced survey course on the field of ecological design. Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development.
Prerequisite: Must have completed one semester of calculus; and (CHEM131 and PHYS121). Or permission of instructor. Also offered as: MEES681.
Credit Only Granted for: ENST481, ENST681, or MEES681.

ENST689 Special Topics (1-3 Credits)
Credit according to time scheduled and organization of the course. Organized as a lecture series on a specialized advanced topic.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: ENST689 or NRSC689.
Formerly: NRSC689.

ENST702 Environmental Science and Technology: Communication and Professional Development (2 Credits)
Training in communication and professional development to prepare students to succeed in careers within the fields of environmental science and technology. Topics will include manuscript and technical writing, job search, communication with academic and non-academic audiences, multi-disciplinary collaboration, management (project, personnel, time), professionalism, leadership, ethics, and career opportunities. Course emphasizes practical training through facilitated discussions and critique practicums.
Prerequisite: ENST602.
Restriction: Must be in Environmental Science and Technology (Master's) program; or must be in Environmental Science and Technology (Doctoral) program; or permission of instructor.

ENST722 Advanced Soil Chemistry (3 Credits)
A continuation of AGRO 421 with emphasis on soil chemistry of minor elements necessary for plant growth.
Restriction: Permission of instructor; and permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST722 or NRSC722.
Formerly: NRSC722.

ENST789 Advances in Research (1-4 Credits)
A study of recent advances in agronomy research.
Repeatable to: 4 credits if content differs.
Credit Only Granted for: ENST789 or NRSC789.
Formerly: NRSC789.

ENST798 Graduate Seminar (1 Credit)
Designed to provide a venue for interactive discussion between ENST graduate students and other members of the ENST community regarding thesis/dissertation research planned or conducted as part of the students graduate program.
Restriction: Must be in one of the following programs (Environmental Science and Technology (Doctoral); Environmental Science and Technology (Master's)) ; or permission of AGNR-Environmental Science & Technology department.
Repeatable to: 6 credits.
Credit Only Granted for: ENST798 or NRSC798.

ENST799 Master's Thesis Research (1-6 Credits)

ENST821 Advanced Methods of Soil Investigation (3 Credits)
First semester, alternate years. An advanced study of the theory of the chemical methods of soil investigation with emphasis on problems involving application of physical chemistry.
Credit Only Granted for: ENST821 or NRSC821.
Formerly: NRSC821.

ENST831 Soil Mineralogy (4 Credits)
Soil minerals, with emphasis on clay minerals, are studied from the viewpoint of soil genesis and physical chemistry. Mineralogical analyses by x-ray and chemical techniques.

ENST832 Advanced Soil Physics (3 Credits)
An advanced study of physical properties of soils.
Restriction: Permission of instructor; and permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST832 or NRSC832.
Formerly: NRSC832.

ENST898 Pre-Candidacy Research (1-8 Credits)

ENST899 Doctoral Dissertation Research (1-8 Credits)

ENTM - Entomology

ENTM609 Integrated Pest Management (1-4 Credits)
A modular course with an interdisciplinary approach to the theory and practice of integrated pest management. Topics of modules, each 3-4 weeks long, vary each semester over a three year time frame, with the first module serving as a prerequisite for all other modules.
Restriction: Permission of instructor.
Repeatable to: 10 credits if content differs. Also offered as: NRSC609.
Credit Only Granted for: ENTM609 or NRSC609.

ENTM612 Insect Ecology (3 Credits)
An advanced course in population and community ecology, plant-insect interactions, and insect biogeography. Emphasis on current entomological literature.
Prerequisite: Permission of CMNS-Entomology department; or must have completed a course in general ecology.

ENTM622 Principles of Systematic Entomology (3 Credits)
The principles of systematics including traditional classification methods, cladistics, and numerical taxonomy. Nomenclature, continental drift, and speciation theory. A laboratory problem in systematics is required.

ENTM623 Insect Population Genetics (3 Credits)
Forces that alter allele and genotype frequencies, population structure, population genetic analysis of molecular data, quantitative genetics, and the implications for biodiversity and pest management.

ENTM667 Aquatic Entomology (3 Credits)
Biology, ecology, and taxonomy of aquatic insects in lotic and lentic habitats, their adaptation to aquatic life, their function in aquatic ecosystems, and their relationship to environmental deterioration.

ENTM699 Advanced Entomology (1-6 Credits)
Credit and prerequisites to be determined by the department. First and second semesters. Studies of minor problems in morphology, physiology, taxonomy and applied entomology, with particular reference to the preparation of the student for individual research.

ENTM701 Effective Teaching: TA Training (1 Credit)
A survey and discussion of topics pertinent to graduate students who are first-time teaching assistants, including teaching responsibilities and policies, effective techniques of lecturing and leading discussions, composing and grading quizzes and exams, cultural diversity, time management, and development of a teaching portfolio. All teaching assistants in the College of Life Sciences must take a 701 TA training course in one of the departments.Also offered as: BISI701.
Credit Only Granted for: ENTM701, BISI688Z, CBMG688Z, or BIOL701.

ENTM710 Insect Biodiversity, Physiology and Ecology (3 Credits)
A survey course discussing the various families of insects, discuss thing their anatomy and physiology, and their role in ecological systems. Students will examine the ecological and evolutionary perspectives on interactions between plants and vertebrate and invertebrate animals. Further, it explores the applied consequences of animal-plant interactions to agroecology and conservation biology. These goals are achieved by reviewing the theoretical underpinnings of animal-plant interactions, and exposing students to research literature on animal-plant interactions.

ENTM720 Native, Invasive, and Exotic Species (3 Credits)
This course will examine introduced species impact, how invasive and exotic species spread, their impact of native species and methods of invasive species control.

ENTM725 IPM Practices (3 Credits)
Introduction to the techniques of integrated pest management for proper pest control management. Integrated Pest Management (IPM) has been the most successful management paradigm for agriculture, forestry, and urban pest management for more than five decades. Students will learn the fundamental elements of IPM programs including recognition and monitoring of key pests, formation of decision-making guidelines, intervention tactics, and fundamentals of assessment.

ENTM730 Plant Diagnostics (3 Credits)
The first step to managing pest and disease problems in plants is an accurate diagnosis. In this course, students will learn about the various biotic (living) and abiotic (nonliving) factors that can contribute to plant problems, and how to evaluate evidence and distinguish between these factors to arrive at an accurate diagnosis.

ENTM735 Sustainability (3 Credits)
Application of the concept of sustainability to both ecosystem services provided by beneficial insects, as well as the management of injurious insects. Ecological functions of insects in the natural and anthropogenic landscape will be illustrated and discussed. In addition, case histories and discussions will focus on themes of sustainability in successful IPM programs, as well as specific practices that lead to sustainable agriculture. The course will conclude with the development of a list of sustainable practices for conserving and managing insects in the landscape.

ENTM740 Organic Practices (3 Credits)
Alternatives to chemical pesticides, what being certified organic entails and how these practices relate to ecological principles. This course will discuss various natural processes that occur in the farm setting to determine the best practices to maintain biodiversity and successful crop production.

ENTM745 Bee Biology and Beekeeping (3 Credits)
Students will be introduced to the anatomy and physiology of the honey bee colony with emphasis on how to use this information to best manage honey bee colonies.

ENTM746 Commercial Beekeeping (3 Credits)
An overview of the various components of the commercial beekeeping industry including migratory pollinators, queen rearing operations and honey producers will be explored.

ENTM747 Pollinator Health (3 Credits)
Students will be given an overview of the importance of insect pollinators and threats to their populations. Emphasis will be placed on managed pollinators, particularly but not exclusively honey bees, where disease mitigation plans will be highlighted.

ENTM751 The History and Culture of Bees and Beekeepers (3 Credits)
An exploration of the history of beekeeping in culture and literature. A comparison of past and present beekeeping practices in different regions of the world will be highlighted.

ENTM756 Insect Diseases and Pathology (3 Credits)
Integrates aspects of biochemistry, molecular biology and evolution theory with ecology using pathogens of insects as a model. The various biotic (living) and abiotic (nonliving) factors that can contribute to plant problems. Explores the direction and goals of innovation in microbial biocontrol as well as the effect of social criticism and considerations of environmental impact on attempts to introduce engineered microorganisms.
Credit Only Granted for: ENTM715 or ENTM756.
Formerly: ENTM715.

ENTM760 Insects in the 21st Century (3 Credits)
This course will explore the influence and impact of major technological advances in genetics, molecular genetics and biotechnology on the study of insects. Topics will include the use of insects as models for studying human biology and diseases; the use of genetics and genetic technologies to augment existing strategies for managing pest insects and well as the invention of novel management approaches; the use of genetics and genetic technologies in the fields of insect conservation, ecology and evolution.

ENTM769 Capstone Course (Scholarly paper) (3 Credits)
An examination of the current literature on topics related to the field of applied entomology. The Capstone Course provides the opportunity to apply and integrate best practices based on current research in the form of a formal scholarly paper.

ENTM788 Entomological Topics (1-3 Credits)
One lecture or one two-hour laboratory period a week for each credit hour. Lectures, group discussions or laboratory sessions on selected topics such as: aquatic insects, biological control of insects, entomological literature, forest entomology, history of entomology, insect biochemistry, insect embryology, immature insects, insect behavior, insect communication, principles of entomological research.
Prerequisite: Permission of CMNS-Entomology department.

ENTM789 Field Experience in Pest Management (1-6 Credits)
Involvement in practical problems of pest management in field situations. The student will be assigned to a problem area for intensive experience, usually during the summer. A final written report is required for each assignment.
Repeatable to: 6 credits.

ENTM798 Topic Seminar (1 Credit)
Discussion and presentation of current research and literature.
Prerequisite: Permission of CMNS-Entomology department.

ENTM799 Master's Thesis Research (1-6 Credits)

ENTM898 Pre-Candidacy Research (1-8 Credits)

ENTM899 Doctoral Dissertation Research (1-8 Credits)

ENTS - Telecommunications

ENTS609 Telecommunications Project (3 Credits)
Consists of a student project in the area of telecommunication system applications, management, or policy. Specific projects will be supervised individually by faculty members associated with the M.S Program in Telecommunications.

ENTS622 Introduction to Digital Communication Systems (3 Credits)
Principles of analog and digital communication systems design. Analysis of the performance and relative merits of different modulation and demodulation, signal processing, filtering and error control schemes in communication systems. Also provides an understanding of the design of modern digital communication systems.
Restriction: Must be in Telecommunications (Master's) program; or permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: ENTS622 or ENTS689B.
Formerly: ENTS689B.

ENTS625 Management and Organizational Behavior in the Telecommunications Industry (3 Credits)
Roles of the general manager in: determining target markets and designing strategies for them; formulating and implementing corporate and business level strategies; and staffing, developing, and managing human resources and coordinating them with the organization's financial and physical resources. Also emphasizes the building of interpersonal skills with respect to the selection of members for work teams and team formation, leadership of teams toward the achievement of strategic goals and total quality, the development and motivation of team members, and the evaluation of team and individual performance.

ENTS629 Special Topics in Cybersecurity (3 Credits)
Selected topics of current importance in cybersecurity.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

ENTS630 The Economics of International Telecommunications (3 Credits)
Basic microeconomic principles used by telecommunications firms, including supply and demand, elasticity, costs, productivity, pricing, market structure and competitive implications of alternative market structures. Market failures and government intervention. Public policy processes affecting business operations.
Restriction: Must be in Telecommunications (Master's) program.

ENTS632 Telecommunications Marketing Management (3 Credits)
Topics covered include strategic marketing, sales and customer service challenges confronting organizations in the computer, communications and media industries. The course also addresses volatile technology, regulatory and competitive environments as a backdrop to strategic planning and management in the marketing domain.
Restriction: Must be in Telecommunications (Master's) program.

ENTS635 Decision Support Methods for Telecommunication Managers (3 Credits)
The aim of this course is to introduce management science techniques for informed decision making. Topics covered can include data analysis and regression, optimization models and applications (workforce scheduling, manufacturing, network design, facility location), sensitivity analysis, decision trees, risk analysis and business simulation models. Emphasis will be on telecommunications managerial problems, model development and the use of software packages for decision support.
Restriction: Must be in Telecommunications (Master's) program.

ENTS639 Special Topics in Business (3 Credits)
Selected topics of current importance in business.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

ENTS640 Networks and Protocols I (3 Credits)
An overview of design issues and the important industry standards for digital communications networks. This includes protocols, data communications technologies, error correction and detection, congestion control, traffic routing, Local Area Network (LAN) protocols, TCP/IP, and some security issues.
Restriction: Must be in Telecommunications (Master's) program.

ENTS641 Networks and Protocols II (3 Credits)
Techniques for the specification, design, analysis, verification and testing of communication protocols are discussed. The course includes detailed discussion on routing protocols in the Internet. This includes Routing Information Protocol (RIP), Enchanced Interior Gateway Routing Protocol (EIGRP). Open Shortest Path First (OSPF), and Border Gateway Protocol (BGP4).
Prerequisite: ENTS640.
Restriction: Must be in Telecommunications (Master's) program.

ENTS649 Special Topics in Networking (3 Credits)
Selected topics of current importance in networking.
Restriction: Must be in Telecommunications (Master's) program.

ENTS653 AWS/PCS System Implementation (3 Credits)
Engineering issues associated with designing and deploying a AWS/PCS cellular wireless communications system in the current world environment will be examined. The course will focus on implementation issues such as the impact of real world concerns on the deployment strategy and the use of good engineering practice to overcome obstacles. Students will create and modify mock deployments using professional tools for cell planning and interference analysis. Students will also be exposed to drive testing tools and concepts for migration to future technologies.
Restriction: Must be in Telecommunications (Master's) program.

ENTS654 Optimization and Analysis of GSM Networks (3 Credits)
The techniques needed to successfully optimize a functioning GSM networkwill be examined. Students will conduct extensive drive tests of a working network in the Washington DC area using state-of-the-art drive test equipment and will analyze the recorded data with post-processing analysis tools. Also, they will learn to recognize problems based on network behaviors and what courses of action are available to correct them. Lab work and data collection will constitute a majority of the class work.
Prerequisite: ENTS656 or ENTS653; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in Telecommunications (Master's) program.
Credit Only Granted for: ENTS654 or ENTS689B.

ENTS656 Introduction to Cellular Communication Networks (3 Credits)
Concepts and techniques involved in wireless digital communications with emphasis on cellular and PCS systems. Properties of Mobile radio channels; intersymbol interference, multipath, and fading effects; interleaving and diversity; multiple access schemes (TDMA, FDMA, CDMA); interuser interference, traffic issues, and cell capacity; power control strategies; frequency reuse and channel assignment; handoff, paging, and location update; cell layout; introduction to cellular and PCS standards.

ENTS657 Satellite Communication Systems (3 Credits)
An examination of satellite telecommunication systems with an emphasis on the mobile satellite systems (MSS). Topics will include a historical perspective, orbital mechanics and constellations, choice of orbital parameters, propagations considerations, link budgets, interference issues and other obstacles, and existing and proposed mobile satellite systems. It will also look at some of the business aspects such as the cost of deploying and maintaining these systems.
Credit Only Granted for: ENTS657 or ENTS689S.
Formerly: ENTS689S.

ENTS659 Special Topics in Communications (3 Credits)
Selected topics of current importance in communications.
Restriction: Must be in Telecommunications (Master's) program.

ENTS669 Special Topics in Computing (3 Credits)
Selected topics of current importance in computing.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits.

ENTS670 Introduction to Business and Enterpreneurship (3 Credits)
This is a fundamental course that provides a broad introduction to various business issues faced by any small business or starup. Course instructors present the key issues involved in outlining a clear value proposition and profitable business model, managing and monitoring finances, developing a winning team, addressing legal considerations, executing on operations including marketing sales, manufacturing and service.
Restriction: Must be in Telecommunications (Master's) program.
Credit Only Granted for: ENTS670 or ENTS689J.

ENTS673 Project Management for Telecommunications (3 Credits)
Introduces modiern project management. Begins with an overview and expands into Adaptive and Extreme project management. The focus then shifts to the individual skills required to be an effective project manager, such as time management, leadership and motivation. Once skills of the individual have been addressed, social networks and how they impact project management are examined.
Formerly: ENTS689P.

ENTS689 Special Topics in Telecommunications (3 Credits)
Selected topics of current importance in telecommunications.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

ENTS699 Independent Study in Telecommunications (1-3 Credits)
Individual instruction course. See ENTS program office for section number.
Repeatable to: 3 credits if content differs.

ENTS749 Advanced Topics in Networking (3 Credits)
Selected advanced topics in networking.
Prerequisite: ENTS640 or ENTS641; or permission of instructor.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

ENTS759 Advanced Topics in Communications (3 Credits)
Selected advanced topics in communications.
Prerequisite: ENTS622; or students who have taken courses with comparable content may contact the department. And (ENTS656 or ENTS653).
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

EPIB - Epidemiology and Biostatistics

EPIB400 Obesity: An Epidemiologic Perspective (3 Credits)
The epidemic of obesity, its causes and consequences, and issues related to energy balance will be covered. Students will characterize the obesity epidemic both nationally and internationally, compare and contrast the metrics of obesity, understand the biological consequences of different obesity phenotypes, and describe characteristics of the obesogenic environment. Throughout the course students will be introduced to the application of epidemiological methods to studies of obesity.
Prerequisite: 1 course with a minimum grade of C- from (EPIB301, HLTH301).

EPIB610 Foundations of Epidemiology (3 Credits)
Introduction to the discipline of epidemiology and its applications to health issues and practices. Basic epidemiologic concepts and methods will be covered.
Prerequisite: EPIB300; or equivalent undergraduate statistics or biostatistics course with a grade of C- or higher; or a score of 70% or higher on EPIB300 placement exam.
Credit Only Granted for: EPIB610 or HLTH720.
Formerly: HLTH720.

EPIB611 Intermediate Epidemiology (3 Credits)
Analysis of epidemiologic methods as applied to epidemiologic research, analysis of bias, confounding, effect modification issues, overview of design, implementation, and analysis of epidemiologic studies.
Prerequisite: 1 course with a minimum grade of B- from (SPHL602, EPIB610); or a minimum score of 70% on the SPHL602 or EPIB610 waiver exam.

EPIB612 Epidemiologic Study Design (3 Credits)
Application of epidemiologic study designs, analytic methods used for analysis of cohort, case-control, cross-sectional, and clinical trials research.
Prerequisite: EPIB611.

EPIB620 Chronic Disease Epidemiology (3 Credits)
Overview of prevalence and risk factors for major chronic diseases. Discussion of methodological issues unique to specific chronic disease.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB621 Infectious Disease Epidemiology (3 Credits)
Overview of the unique aspects of infectious diseases and the epidemiological methods used in their study, prevention, and control.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB622 Social Determinants of Health (3 Credits)
Overview of the major social variables that affect public health, including socioeconomic status, poverty, income distribution, race, social networks/support, community cohesion, psychological stress, gender, and work and neighborhood environment.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB623 Epidemiologic Methods in Health Disparities Research (3 Credits)
An examination of the measurement, monitoring, analysis, and reporting of health disparities in the U.S. Through in-depth examples and class activities, students will learn about the state of health disparities, epidemiologic methods for health disparity assessments, and best practices for translating data on health disparities for policy makers.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB624 Genetic in Public Health (3 Credits)
Emerging role of genetics in public health; overview of basic tenets of human genetics; examination of how public health practices and research are influenced by genetics and ethical issues specific to genetics.
Prerequisite: EPIB610.

EPIB625 Epidemiology of Physical Activity (3 Credits)
Overview of evidence of the epidemiological association of physical activity to a variety of health outcomes, application of epidemiological methods to the science of physical activity and health.
Prerequisite: EPIB610.

EPIB626 Epidemiology of Obesity (3 Credits)
Overview of the epidemiological, prevention, and treatment of obesity, its causes and consequences, and energy balance issues; application of epidemiologic methods to the study of obesity epidemiology.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB627 Epidemiologic Methods for Primary Research (3 Credits)
Students are provided with the knowledge and skills needed to design and implement epidemiological research studies and to collect primary data. Presents an overview of types of research designs, sampling methodologies, measurement issues, questionnaire design, and guidelines for recruiting and interacting with participants. This foundation of knowledge is applied to group assignments, which apply the steps involved in the primary data collection process. Goals include: (a) achieving competence in designing and implementing studies based on scientifically sound epidemiological research methods; and (b) gaining the ability to critically evaluate health research and epidemiological studies.
Prerequisite: EPIB610; or permission of instructor.
Credit Only Granted for: EPIB600 or EPIB627.
Formerly: EPIB660.

EPIB630 Epidemiologic Methods in Sexual and Reproductive Health Research (3 Credits)
Examination of epidemiologic methods (quantitative and qualitative) for collecting and analyzing data on sexual and reproductive health. The emphasis will be to introduce students to the appropriate methods used for challenging and sensitive research topics such as sexual behavior, HIV/STI, drug use, sexual abuse.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB631 Cancer Epidemiology (3 Credits)
This combines public health disciplines including epidemiological methods, molecular biology, pathology, clinical and social/behavioral sciences to explore modern cancer epidemiology, prevention and control in the United States and internationally. Emphasis will be placed on those cancers of high prevalence or unique biological characteristics that illustrate interesting epidemiological or etiological characteristics.
Prerequisite: EPIB610; or must have completed or be concurrently enrolled in SPHL602; or permission from instructor.
Additional Information: This course is being jointly offered with the University of Maryland Baltimore and will be taught at the College Park campus.

EPIB633 Health Survey Design and Analysis (3 Credits)
An overview of types of survey research designs, questionnaire design, measurement issues, and techniques for recruiting and interacting with participants. Students will discuss and implement a variety of health survey analysis techniques, including how to utilize SAS statistical software to estimate descriptive statistics and implement regression models, while accounting for complex survey designs.
Prerequisite: SPHL602 or EPIB610; or permission of Instructor.
Recommended: EPIB697.

EPIB634 Applied Data Analysis in Social Epidemiology and Behavioral Health (3 Credits)
Focuses on the application of factor analysis, mediation analysis using path analytic model, and structural equation model in social epidemiology and behavioral health. Application of these analytical methods using SAS.
Prerequisite: EPIB610 and EPIB650; or permission of instructor.

EPIB635 Applied Multilevel Modeling of Health Data (3 Credits)
Provides an overview of multilevel models and their application to health data. As a hybrid course, class time will be split between introducing concepts, group discussion of multilevel models in public health literature, and working through hands-on exercises. Assignments and examples will use SAS statistical software.
Prerequisite: SPHL602. Or EPIB610; and EPIB650. Or permission from Instructor.
Recommended: EPIB697; or students are recommended to have a foundation in using SAS statistical software.

EPIB641 Public Health and Research Ethics (1 Credit)
Overview and discussion of ethical issues that face public health practitioners and researchers.

EPIB650 Biostatistics I (3 Credits)
Basic statistical concepts and procedures for Public Health. Focuses on applications, hands-on-experience, and interpretations of statistical findings.
Prerequisite: EPIB300; or equivalent undergraduate statistics or biostatistics course with a grade of C- or higher; or a score of 70% or higher on EPIB placement exam.
Credit Only Granted for: EPIB650, HLTH651, or HLTH688B.
Formerly: HLTH651 and HLTH688B.

EPIB651 Applied Regression Analysis (3 Credits)
An introduction to important statistical methods used in public health research, including nonparametric hypothesis testing, ANOVA, simple and multiple linear regression, logistic regression, and categorical data analysis.
Prerequisite: 1 course with a minimum grade of B- from (SPHL602, EPIB650); or a minimum score of 70% on the SPHL602 or EPIB650 waiver exam.
Recommended: EPIB697 or previous experience working with SAS is highly recommended.

EPIB652 Categorical Data Analysis (3 Credits)
Methods for analysis of categorical data as applied to public health research, including contingency tables, logistic regression, multicategory logic models, loglinear models, and models for matched-pairs.
Prerequisite: EPIB651.
Recommended: EPIB697 or previous experience working with SAS is highly recommended.

EPIB653 Applied Survival Data Analysis (3 Credits)
Overview of statistical methods for anlayzing censored survival data, including the Kaplan-Meier estimator, the log-rank test, Cox PH model.
Prerequisite: EPIB651.

EPIB655 Longitudinal Data Analysis (3 Credits)
Statistical models for drawing scientific inferences from longitudinal data, longitudinal study design, repeated measures and random effects to account for experimental designs that involve correlated responses, handling of missing data.
Prerequisite: EPIB651.

EPIB656 Applied Bayesian Data Analysis (3 Credits)
The theory and practical application of Bayesian statistical methods in the field of public health and related areas. A variety of models will be discussed including linear regression, multilevel model, generalized linear model, generalized linear mixed model.
Prerequisite: EPIB652 or STAT700; or permission of instructor.

EPIB657 Spatial Statistics for Public Health Data (3 Credits)
Overview three main areas of spatial statistics: point patterns, geostatistical data, and lattice (areal) data. Application of spatial statistical models including CSR, k-function, krigging, semivariogram, CAR, SAR, GWR, spatial GLM, and multilevel model to public health and environmental data analysis.
Prerequisite: EPIB651 and EPIB652; or permission of instructor.

EPIB660 Analysis of National Health Survey Data (3 Credits)
Provides background on how features such as stratification, clustering, and unequal sample selection probabilities can invalidate the assumptions underlying traditional statistical techniques, those implicitly assuming a simple random sampling with replacement design. Application using the SURVEY family of SAS/STAT procedures (Version 9.4 or later).
Prerequisite: EPIB650; or permission from Instructor.
Recommended: EPIB697.

EPIB663 SAS Programming (3 Credits)
Learn how to analyze and summarize data using SAS. The course begins by introducing the students to basic SAS programming and data manipulation techniques. More advanced themes, such as preliminary data analysis and graphs, are explored later in the semester. Finally, the class covers the implementation of several advanced statistical concepts in SAS, including T-tests, ANOVA, non-parametric tests, regression and normality tests.
Credit Only Granted for: EPIP698E or EPIB663.
Formerly: EPIB698E.

EPIB672 Public Health Informatics (3 Credits)
A basic overview of Informatics and its application in a public health setting. The major goal is for students to understand the basic tools and building blocks needed to utilize this technology in order to improve their professional productivity
Restriction: Instructor permission is required for students not enrolled in a degree seeking program in the School of Public Health. Also offered as: HLTH672.
Credit Only Granted for: HLTH670 or HLTH672 or EPIB672.
Formerly: HLTH670.
Additional Information: Course hashtag - #umdphi12.

EPIB697 Public Health Data Management (3 Credits)
This course is designed to provide students with the expertise needed to effectively manage research data using SAS as the statistical programming language.
Prerequisite: Permission of instructor.

EPIB698 Special Topics in Epidemiology and Biostatistics (1-3 Credits)
Open to master or doctoral students who desire to pursue special topics in Epidemiology and Biostatistics.

EPIB710 Grantsmanship for Epidemiologic Research (3 Credits)
In-depth study of the knowledge and skills needed to design, conduct, and evaluate an epidemiologic research study. Development of a complete research project.
Prerequisite: EPIB650, EPIB610, EPIB612, EPIB651, and EPIB611.

EPIB740 Advanced Methods in Epidemiology (3 Credits)
In-depth investigation of epidemiologic methods for making causal inferences and solving complex methodological problems. Multivariate models emphasized.
Prerequisite: EPIB650, EPIB610, EPIB612, EPIB651, and EPIB611.

EPIB778 Internship in Public Health (1-4 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: Permission of SPHL-Epidemiology & Biostatistics department.
Repeatable to: 4 credits.
Credit Only Granted for: EPIB785 or EPIB778.

EPIB786 Capstone Project in Public Health (3 Credits)
Capstone experience providing opportunity to apply knowledge and skills to a specific public health problem or issue. Completion of project relevant to public health under the direction of an advisor.
Prerequisite: Permission of SPHL-Epidemiology & Biostatistics department.

EPIB788 Critical Readings in Epidemiology and Biostatistics (1-3 Credits)
Open to master and doctoral students to discuss critical readings in Epidemiology and Biostatistics.
Prerequisite: Must have completed or be concurrently enrolled in EPIB610.
Repeatable to: 6 credits if content differs.

EPIB798 Independent Study (1-6 Credits)
Master or doctoral students who desire to pursue special research problems under the direction of a faculty memeber of the department may register for 1-6 hours of credit under this number.
Prerequisite: Permission of SPHL-Epidemiology & Biostatistics department.
Repeatable to: 9 credits if content differs.

EPIB799 Master's Thesis Research (1-6 Credits)

EPIB898 Pre-Candidacy Research (1-8 Credits)

EPIB899 Doctoral Dissertation Research (1-8 Credits)

FILM - Film Studies

FILM410 Documentary and Narrative (3 Credits)
An examination of the relationship between film and reality, focusing on documentary film.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of ARHU-College of Arts & Humanities. Also offered as: SLLC410.
Credit Only Granted for: SLLC410 or FILM410.

FILM411 Experimental Film (3 Credits)
Introductory survey of European and U.S. American experimental cinema.Also offered as: SLLC411.
Credit Only Granted for: SLLC411 or FILM411.

FILM412 Animation and Cinema (3 Credits)
An examination of animation in art, cinema, and other media.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of ARHU-College of Arts & Humanities.
Credit Only Granted for: FILM412 or ENGL468C.

FILM419 Special Topics in Documentary, Animation, Experimental Cinema, and Other Media (3 Credits)
Advanced studies in Documentary, Animation, Experimental Cinema, and Other Media. Examines the possibilities of non-narrative cinema, or cinema that is structured differently from the fiction feature film, as well as other media (television, digital imagery, and photography) that entertain a close relationship with cinema in terms of form, content, and audience. Content varies.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; and or permission of ARHU College of Arts and Humanities.
Restriction: Varies depending on the crosslist.
Repeatable to: 6 credits if content differs.

FILM420 French Cinema: A Cultural Approach (3 Credits)
A study of French culture, civilization, and literature through the medium of film. Taught in English.Also offered as: FREN480.
Credit Only Granted for: FREN480 or FILM420.

FILM421 Francophone African Film (3 Credits)
Imaginary and Memory in the Reality of Francophone African Film from 1960-present. Taught in English.Also offered as: FREN421.
Credit Only Granted for: FREN421 or FILM421.

FILM423 Women and French Cinema (3 Credits)
Cultural identity, social boundaries and gender roles in French film as well as introduction to film textual analysis and diverse film theories (semiotics, film and psychoanalysis, feminist film theory, structuralism, narratology, spectatorship and cultural studies). Taught in French.Also offered as: FREN423.
Credit Only Granted for: FREN423 or FILM423.

FILM426 Modern Chinese Film and Visual Culture (3 Credits)
Modern Chinese culture, society, and history studied through examples of art, film, and visual culture.Also offered as: ARTH484.
Credit Only Granted for: FILM426 or ARTH484; ARTH489F in F2012, F2011, F2008, or S2009; or ARTH488F in S2010, S2008, or F2009.
Formerly: ARTH489F in F2012, F2011, F2008, or S2009; or ARTH488F in S2010, S2008, or F2009.

FILM427 Visions and Fictions from Spain (3 Credits)
Overview of Spanish Cinema from the end of the 19th century through present day Spain. Exploration of the production of literary and cinematic texts in their sociohistorical, political, religious and cultural contexts. Taught in Spanish.
Prerequisite: SPAN331, SPAN332, or SPAN333; or students who have taken courses with comparable content may contact the department; or permission of ARHU-Spanish & Portuguese Languages & Literatures department. Also offered as: SPAN427.
Credit Only Granted for: FILM427 or SPAN427.

FILM429 Special Topics in National/International Cinemas (3 Credits)
Courses in National/International Cinemas may examine one or more national cinematic traditions (including Hollywood cinema), or may look across traditions comparatively, for example at international and/or transnational phenomena. Content varies.
Repeatable to: 6 credits.

FILM430 Critical Issues in Israeli Cinema (3 Credits)
Critical investigation of Zionist and Israeli culture and politics through film.Also offered as: HEBR430.
Credit Only Granted for: HEBR430 or FILM430.

FILM431 Italian Cinema II - In Translation (3 Credits)
A study of Italian society and culture through the medium of film from the mid 1970's to the present. Taught in English.Also offered as: ITAL473.
Credit Only Granted for: ITAL473, ITAL474, or FILM431.

FILM433 Holocaust in Italian Literature and Cinema (3 Credits)
Review of literature and theoretical writings of Italy's most famous survivor, Primo Levi, to a sampling of Italian films that focus in vastly different and often extremely controversial ways on the experience of the concentration camp, while addressing a series of central questions from the brutal realities of the camps to the "compromises" made in order to survive, the need to bear witness, and the idea of the survivor's guilt.Also offered as: ITAL433.
Credit Only Granted for: ITAL433, or FILM433.

FILM441 Italian Cinema I: Neorealism (3 Credits)
Explores representations of Italy in cinema with special focus on identity formation and the movement of Italian neorealism and post neorealism. Taught in English.Also offered as: ITAL436.
Credit Only Granted for: FILM441 or ITAL436.

FILM451 Film Noir and American Culture (3 Credits)
Introduction to a variety of American movies made in the 1940s and 1950s whose dark themes and stark black-and-white lighting led to their identification as film noir.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of ARHU-College of Arts & Humanities.
Restriction: Must not have completed ENGL428A (Summer 2006, Spring 2007, Summer 2009) or ENGL379Q (Fall 2009) or HHUM106 (Spring 2012), or ARTH389A (Spring 2012).
Credit Only Granted for: FILM451, ENGL468D, ENGL428A ,ENGL379Q, HHUM106, or ARTH389A (Spring 2012).
Formerly: ENGL428A and ENGL379Q.

FILM452 Origins of Cinema (3 Credits)
An in-depth engagement with the specificity of early cinema, dedicated to a comparative framework that compares the early cinema period (1890-1915) to other moments of media emergence, both before and after cinema, with special emphasis on the current, "digital" moment.
Prerequisite: ENGL245, FILM245, FILM283, or SLLC283; or permission of Film Studies Program.
Credit Only Granted for: FILM452 or ENGL468G.

FILM459 Special Topics in Genres/Auteurs/Cinema Movements (3 Credits)
Special topics in genres, auteurs, and cinema movements.
Repeatable to: 6 credits.

FILM461 Political Cinema (3 Credits)
Histories of cinemaa and politics in the 20th century.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of ARHU-College of Arts & Humanities. Also offered as: SLLC461.
Credit Only Granted for: SLLC461, FILM461, SLLC468P, or CMLT498P.
Formerly: SllC468P and CMLT498P.

FILM462 Realism and the Real in Film (3 Credits)
Exploration of the problem of realism, one of the most central theoretical issues in film studies.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of instructor.
Credit Only Granted for: FILM359R, SLLC368R or FILM462.
Formerly: FILM359R/SLLC368R.

FILM463 Screening Time: History and Memory in Cinema (3 Credits)
An examination of the ways and techniques with which cinema produces a sense of time in the viewer.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of ARHU-College of Arts & Humanities. Also offered as: SLLC463.
Credit Only Granted for: SLLC463 or FILM463.

FILM464 The Violence of Cinema (3 Credits)
An investigation of cinema's multifaceted relationship to violence.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of instructor.
Credit Only Granted for: FILM469A/SLLC468A or FILM 464.
Formerly: FILM469A/SLLC468A.

FILM469 Special Topics in Film Theories II (3 Credits)
Special topics in film theories.
Repeatable to: 6 credits.

FMSC - Family Science

FMSC420 African American Families (3 Credits)
Examination of the history, structure, cultural foundation, and diversity of African American family life is the focus of this class. Presentations and discussions enable students to identify, analyze, and assess: (1) the major theoretical perspectives used in the study of African American families; (2) the impact of social policy on African American families; and (3) specific areas of family life (e.g., marriage and divorce, parenting, child development, health disparities).
Recommended: FMSC330.
Credit Only Granted for: FMSC420 or FMSC498F.
Formerly: FMSC498F.

FMSC425 Military and Veteran Family Services (3 Credits)
Overview of issues impacting contemporary military families including during times of war. Identification of challenges faced by military families related to deployment/reunion and mental and physical health, as well as support systems available. Examination of skills and strategies for working with service members, veterans, and military families.
Recommended: Moderate level of computer literacy, especially Internet and ELMS. Reliable computer and Internet access.
Credit Only Granted for: FMSC425 or FMSC498W.
Formerly: FMSC498W.

FMSC430 Gender Issues in Families (3 Credits)
The development of historical, cultural, developmental, and psychosocial aspects of masculinity and femininity within the context of contemporary families and the implications for interpersonal relations.
Prerequisite: SOCY100, SOCY105, or PSYC100. Also offered as: WMST430.
Credit Only Granted for: FMSC430, FMST430, or WMST430.
Formerly: FMST430.

FMSC431 Family Crises and Intervention (3 Credits)
Family crises such as divorce, disability, substance abuse, financial problems, intra-familial abuse, and death. Theories and techniques for intervention and enhancement of family coping strategies.
Prerequisite: PSYC100.
Credit Only Granted for: FMSC431 or FMST431.
Formerly: FMST431.

FMSC432 Adult Development and Aging in Families (3 Credits)
Theory, research, history, and programming related to adult development and aging in the intergenerational context of family.
Prerequisite: PSYC100; and (SOCY100 or SOCY105). And FMSC332; or must have completed a comparable development course.
Restriction: Must be in a major within SPHL-Family Science department.
Credit Only Granted for: FMSC432 or FMST432.
Formerly: FMST432.

FMSC440 Death and Loss in Family Life (3 Credits)
Examination of how families experience grief and loss resulting from the death of a family member, including health and financial consequences. Overview of historical, social, psychological, cultural, medical, and legal dimensions of death in families from diverse backgrounds. Exploration of how the health care system and funeral home industry assist families in managing death and loss.
Recommended: Moderate level of computer literacy, especially Internet and ELMS. Reliable computer and Internet access.
Credit Only Granted for: FMSC440 or FMSC498B.
Formerly: FMSC498B.

FMSC445 Sexuality: Issues in Family Therapy and Service Delivery (3 Credits)
Typical, dysfunctional, and pathological sexual functioning, including effects on individuals, couples, and family systems. Sensitizes students to sexual issues, explores how perceptions of such issues affect work with people, and emphasizes implications for marriage and family therapy.
Prerequisite: A basic course in human sexuality; and permission of instructor. Also offered as: FMSC645.
Credit Only Granted for: FMSC445 or FMSC498T.
Formerly: FMSC498T.

FMSC460 Violence in Families (3 Credits)
Theories of child, spouse, and elder abuse in the family setting. Emphasis on historical, psychological, sociological and legal trends relating to physical, emotional, and sexual abuse. Introduction to methods for prevention and remediation.
Prerequisite: SOCY100, SOCY105, or PSYC100.
Credit Only Granted for: FMSC460 or FMST460.
Formerly: FMST460.

FMSC477 Internship and Analysis in Family Science (3 Credits)
A supervised internship and a seminar requiring analysis. Opportunities to integrate theory and practice including 120 hours of contracted field experience. Summer or fall internship contracts due May 1; Spring contracts due December 1. See department for application procedures.
Prerequisite: FMSC383; and 9 credits in FMSC courses; and permission of SPHL-Family Science department.
Restriction: Must be in a major within SPHL-Family Science department.
Credit Only Granted for: FMSC477, FMST347, or FMST477.
Formerly: FMST477.

FMSC485 Introduction to Family Therapy (3 Credits)
The fundamental theoretical concepts and clinical procedures of marital and family therapy including premarital and divorce therapy issues.
Prerequisite: FMSC330; or 1 course from PSYC300-499 course range.
Credit Only Granted for: FMSC485 or FMST485.
Formerly: FMST485.

FMSC487 Legal Aspects of Family Problems (3 Credits)
Laws and legal procedures, with emphasis on adoption, marriage, divorce, annulment, and property rights, and how they affect family life.
Credit Only Granted for: FMSC487 or FMST487.
Formerly: FMST487.

FMSC498 Special Topics: Family Science (1-3 Credits)
Special course topics in family studies.
Prerequisite: Permission of SPHL-Family Science department.
Repeatable to: 6 credits if content differs.
Formerly: FMST498.

FMSC600 Family Theories (3 Credits)
An overview of the theoretical frameworks underlying research on the family. Survey of research findings.
Credit Only Granted for: FMSC600 or FMST600.
Formerly: FMST600.

FMSC606 Ethnic Families and Health Disparities (3 Credits)
Historical, psychosocial, economic, and political factors influencing the structure and functioning of ethnic families. Overview of racial and ethnic health disparities over the life course and ways in which they are influenced by multi-level contextual factors.
Credit Only Granted for: FMSC606 or FMST606.
Formerly: FMST606.

FMSC610 Research Methods in Family Science (3 Credits)
Research methods in family science. The role of theory, design, use of qualitative and quantitative measurement techniques, data collection and data analysis. Development of research proposals.
Prerequisite: EDMS645; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: FMSC610 or FMST610.
Formerly: FMST610.

FMSC640 Family Therapy: Theory and Techniques (3 Credits)
Overview of fundamental theoretical concepts and clinical procedures in marital and family therapy, with an emphasis on those therapies which operate from a family systems perspective.
Credit Only Granted for: FMSC640 or FMST640.
Formerly: FMST640.

FMSC641 Couples Therapy, Theory, and Techniques (3 Credits)
Overview of theoretical models of couple relationships and methods of facilitating growth and interaction within those relationships. Emphasis on couples with conflicting needs and expectations, and dysfunctional communication and conflict negotiation skills.
Prerequisite: FMSC640.
Credit Only Granted for: FMSC641 or FMSC641.
Formerly: FMST641.

FMSC642 Normal and Abnormal Individual and Family Development (3 Credits)
Normal development and psychopathology in the family system. Emphasis on parent-child relationships and application of the current Diagnostic and Statistical Manual of Mental Disorders (DSM) to family therapy.
Prerequisite: FMSC640.
Credit Only Granted for: FMSC642 or FMST642.
Formerly: FMST642.

FMSC645 Sexuality: Issues in Family Therapy and Service Delivery (3 Credits)
Typical, dysfunctional, and pathological sexual functioning: effects on individuals, couples, and family systems. Sensitizes students to sexual issues, explores how perceptions or such issues affect work with people, and emphasizes implications for marriage and family therapy.
Prerequisite: Must have completed a basic course in human sexuality.
Restriction: Permission of instructor.
Credit Only Granted for: FMSC645 or FMST645.
Formerly: FMST645.

FMSC646 Sex Therapy: Theory, Skills, and Practice (3 Credits)
Introduction to the theory and practice of sex therapy, including information about human sexual function and dysfunction and appropriate intervention methods. Emphasis on the relationship and the dynamics of sexual functioning within that system.
Prerequisite: FMSC645; or permission of SPHL-Family Science department.

FMSC647 Theory and Techniques of Family Mediation (3 Credits)
An introduction to family mediation as an approach to helping families deal effectively with the issues associated with separation and divorce. Theory, practice, and techniques of negotiation, with an emphasis on custody, property division, and the constructive restructuring of family relationships.
Credit Only Granted for: FMSC647 or FMST647.
Formerly: FMST647.

FMSC650 Ethical, Legal, and Professional Principles in Marriage and Family Therapy (3 Credits)
An introduction to the basic principles and practices of family therapy. Emphasis on basic therapy skills applied to a family context and on professional ethics of the family practitioner. Addresses therapist's legal responsibilities and liabilities, certification, and licensure issues.
Prerequisite: Permission of SPHL-Family Science department.
Restriction: Must be in Couple and Family Therapy (Master's) program.
Credit Only Granted for: FMSC650 or FMST650.
Formerly: FMST650.

FMSC651 Psychopathology in the Family Context (3 Credits)
Diagnosis and treatment of psychopathology within the family context, with application of various family therapy models.
Prerequisite: FMSC650.
Restriction: Must be in Couple and Family Therapy (Master's) program.
Credit Only Granted for: FMSC651 or FMST651.
Formerly: FMST651.

FMSC652 Diagnosis and Treatment of Mental and Emotional Disorders in Family Systems (3 Credits)
Systematic assessment, diagnosis, and treatment of mental and emotional disorders in couples and families. Utilization and critique of the current Diagnostic Statistical Manual Disorders (DSM).
Prerequisite: FMSC651.
Restriction: Must be in Couple and Family Therapy (Master's) program.
Credit Only Granted for: FMSC652 or FMST652.
Formerly: FMST652.

FMSC653 Advanced Application of MFT Models and Techniques (3 Credits)
Advanced application and integration of family therapy skills and theoretical models in the practice of marriage and family therapy. Emphasis on treatment plans from different therapeutic models demonstrated in case presentations and supervision of therapy.
Prerequisite: FMSC652.
Restriction: Must be in Couple and Family Therapy (Master's) program.
Credit Only Granted for: FMSC653 or FMST653.
Formerly: FMSC653.

FMSC654 Clinical Marriage and Family Therapy Practice (3 Credits)
Application of theory and technique to the clinical practice of marriage and family therapy. Emphasis on case management and clinic administration. Includes completion of 12 successive months and 500 hours of supervised, direct client contact with couples, families, and individuals from an integrative family systems perspective.
Prerequisite: FMSC651.
Restriction: Must be in Couple and Family Therapy (Master's) program.
Credit Only Granted for: FMSC654 or FMST654.
Formerly: FMST654.

FMSC658 Supervised Clinical Practice of Marriage and Family Therapy (1-3 Credits)
The supervision of marriage and family therapy client contact. Various family systems models of supervision applied via extant methods, including live, videotaped, and audiotaped.
Prerequisite: FMSC650.
Restriction: Permission of instructor.
Repeatable to: 12 credits if content differs.
Formerly: FMST658.

FMSC660 Program Planning and Evaluation in Family Science (3 Credits)
Theory and methods of program planning and evaluation with special emphasis on family programs. Assessment of program goals and the social and psychological factors involved in program implementation. Methods for measuring the effectiveness of program delivery, as well as the impact of services on family functioning.
Credit Only Granted for: FMSC660 or FMST660.
Formerly: FMST660.

FMSC668 Special Topics in Family Sciences (1-3 Credits)

FMSC689 Research Internship (1-3 Credits)
Research experience resulting in a scholarly article suitable for publication in a peer-reviewed journal.
Prerequisite: Permission of instructor; and permission of SPHL-Family Science department.
Repeatable to: 3 credits if content differs.
Formerly: FMST689.

FMSC698 Advanced Topics in Family Science (1-3 Credits)
Arranged group study on specific topic which may vary from term to term.
Repeatable to: 12 credits.
Formerly: FMST698.

FMSC699 Independent Study (1-6 Credits)

FMSC710 Maternal and Child Health from a Life Course Perspective (3 Credits)
Survey of current science in maternal and child health informed by a life course perspective. The surveyed topics include inutero exposure to toxins, feeding and growth, and effects of chronic stress, maternal and child health.
Credit Only Granted for: FMSC710 or FMST710.
Formerly: FMST710.

FMSC720 Study Design in Maternal Child Health Epidemiology (3 Credits)
A detailed survey of key epidemiologic study designs provided through readings, lectures, and exercises. Lectures begin by considering the evolution of epidemiologic thought and parallel developments in design of epidemiologic studies. Topics covered include assessment of causality in observational studies, investigation of acute outbreaks, survey design, cohort and case-control study designs, clinical randomized trials, and discussion of issues pertaining to measurement error in the assessment of exposures and outcomes in epdemiologic studies.
Prerequisite: EPIB610. Also offered as: EPIB612.
Credit Only Granted for: EPIB612 or FMSC720.

FMSC730 Key Topics in Maternal and Child Health (3 Credits)
Review of key issues on the frontier of maternal and child health research and practice within broad public health and socio-cultural context. Examines current maternal and child health issues such as ethics, child and family health, health and socioeconomic disparities, child nutrition and obesity, military family health, and global health.
Restriction: Permission of instructor.

FMSC745 Gender and Ethnicity in Family Therapy and Service Delivery (3 Credits)
Major critiques of sources of racial, cultural, and gender bias in marital and family therapy and family service delivery. Addresses these issues in program development and clinical practice.
Credit Only Granted for: FMSC745 or FMST745.
Formerly: FMST745.

FMSC750 Family and Health Policy (3 Credits)
Development and analysis of public policies affecting the health and well-being of children, youth, and families, with an emphasis on low income and ethnic minority populations. Examination of social, economic, and political dynamics that influence family and health policies and the delivery of health care. Introduction to health advocacy within the US public health system.
Credit Only Granted for: FMSC750 or FMST750.
Formerly: FMST750.

FMSC758 Supervision of Marriage and Family Therapy Supervision (1-3 Credits)
Designed to provide supervision of marriage and family therapy supervision. Limited to students who have completed a Marriage and Family Therapy (MFT) Program or its equivalent, have completed an approved MFT supervision course, and are supervisors-in-training. Supervised supervision will incorporate various family systems, models and methods.
Prerequisite: Permission of SPHL-Family Science department.
Repeatable to: 12 credits if content differs.
Formerly: FMST758.

FMSC760 Legal Issues & Families (3 Credits)
Analysis of marriage and family issues from a legal perspective. Review of legal decisions affecting families, including procreative rights, marriage, termination of marriage, parental and child rights, adoption, child custody, and child/family medical treatment. Relationship between family law and family policy.
Credit Only Granted for: FMSC760 or FMST760.
Formerly: FMST760.

FMSC780 Qualitative Methods in Family and Health Research (3 Credits)
Theoretical perspectives and methodological tools to conduct research with individuals and families across the life span. Review of research designs, participant fieldwork, observation and interview projects, data collection, computer-assisted data analysis, and development of grounded theory.
Credit Only Granted for: FMSC780 or FMST780.
Formerly: FMST780.

FMSC789 Non-Thesis Research (1-3 Credits)
Non-thesis option research papers.
Repeatable to: 6 credits if content differs.
Formerly: FMST789.

FMSC790 Marriage and Family Therapy Supervision (3 Credits)
Theory and research in supervision of marriage and family therapy. Emphasis on major models, articulation of personal model, and demonstration of perceptual, conceptual, and executive skills in marriage and family therapy supervision. Designed to meet the didactic course component of the designation of Approved Supervisor of the American Association for Marriage and Family Therapy.
Prerequisite: Permission of SPHL-Family Science department.
Credit Only Granted for: FMSC790, FMST690, or FMST790.
Formerly: FMST790.

FMSC799 Master's Thesis Research (1-6 Credits)

FMSC810 Theory in Family Systems and Family Health (3 Credits)
Theory and research on family interaction and family coping with normative health and mental health transitions and non-normative crises across the family life cycle. Micro-analysis of family process in communication, decision-making, problem-solving, and compliance to health regimens. Examination of dysfunctional patterns and effective coping strategies.
Restriction: Permission of instructor.
Credit Only Granted for: FMSC810, FMST698P, or FMST810.
Formerly: FMST810.

FMSC850 Maternal & Child Health Epidemiology (3 Credits)
Determinants and trends in Maternal and Child Health, including analysis of the role of economic inequalities, race and ethnicity, community contexts, and psychosocial factors across the life course. Overview of methods and data systems used to monitor Maternal and Child Health. Development of a complete population health study.
Restriction: Permission of instructor.
Credit Only Granted for: FMSC850, FMST698P, or FMST850.
Formerly: FMST850.

FMSC879 Preparing Future Faculty and Professionals Seminar (1 Credit)
Development of skills necessary to obtain and succeed in academic and non-academic positions in family science and public health. Topics include: career mapping, networking, teaching/teaching portfolios, independent research, publishing, grant writing, program and policy evaluation, consulting, job search, interviewing and negotiation, mentoring, diversity, work-family balance, and ethical issues in the workplace. Periodic visits to universities and government/nonprofit employers.
Restriction: Must be in one of the following programs (Family Science (Doctoral); Maternal and Child Health (Doctoral)).
Repeatable to: 4 credits.

FMSC898 Pre-Candidacy Research (1-8 Credits)

FMSC899 Doctoral Dissertation Research (1-8 Credits)

FOLA - Foreign Language

FOLA408 Foreign Language I (3 Credits)
Intensive study of a foreign language or related topic not available under one of the current foreign language departments or programs. May not be used to fulfill the arts and humanities language requirement.

FOLA409 Foreign Language II (3 Credits)
A continuation of FOLA 408. May not be used to fulfill arts and humanities language requirement.
Prerequisite: FOLA408; and pre-requisite must be in corresponding subject language.

FOLA459 Foreign Literature in Translation (3 Credits)
Reading and discussion of selected authors, periods or genres of a foreign literature not otherwise offered. All readings and instruction in English.
Repeatable to: 6 credits if content differs.

FREN - French

FREN400 Applied Linguistics (3 Credits)
The nature of applied linguistics and its contribution to the effective teaching of foreign languages. Comparative study of English and French, with emphasis upon points of divergence. Taught in French.
Prerequisite: FREN301; or permission of ARHU-French & Italian Languages & Literatures department.

FREN407 History of the French Language (3 Credits)
Evolution of the French language from Latin to modern French. Taught in French.
Prerequisite: FREN351 or FREN352; or permission of ARHU-French & Italian Languages & Literatures department.

FREN421 Francophone African Film (3 Credits)
Imaginary and Memory in the reality of Francophone African Film from 1960-present. Taught in English.Also offered as: FILM421.
Credit Only Granted for: FREN421 or FILM421.

FREN423 Women and French Cinema (3 Credits)
Cultural identity, social boundaries and gender roles in French film as well as introduction to film textual analysis and diverse film theories (semiotics, film and psychoanalysis, feminist film theory, structuralism, narratology, spectatorship and cultural studies). Taught in French.
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department. Also offered as: FILM423.
Credit Only Granted for: FREN423 or FILM423.

FREN429 Studies in French Literature and Culture of the Renaissance (3 Credits)
Selected topics in French literature of the Renaissance.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN439 Studies in 17th Century French Literature and Culture (3 Credits)
Selected topics in seventeenth-century French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN449 Studies in 18th Century French Literature and Culture (3 Credits)
Selected topics in eighteenth-century French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN459 Studies in 19th Century French Literature and Culture (3 Credits)
Selected topics in nineteenth-century French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN469 Studies in 20th Century French Literature and Culture (3 Credits)
Selected topics in twentieth-century French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN471 The Construction of French Identity I: From the Origins to the Age of Versailles (3 Credits)
French life, customs, culture, traditions (800-1750).
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.

FREN472 The Construction of French Identity II: From the Revolution to the Early Twentieth Century (3 Credits)
French life, customs, culture, traditions (1750 to the early twentieth century).
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.

FREN473 The Construction of French Identity III: Cross-Cultural Approaches to the Study of Contemporary French Society (3 Credits)
Patterns of communication, mythology, and ideology in modern France, from the Third Republic to the present, through historical and cross-cultural approaches, with reference to the Francophone world.
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.

FREN474 Contemporary France: A Sociocritical Approach (3 Credits)
A sociocritical approach to understanding modern French society through the study of print and non-print media documents (autobiography, film, and paraliterature), with reference to the Francophone world. Taught in French.
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.
Recommended: FREN473.

FREN478 Themes and Movements of French Literature in Translation (3 Credits)
Studies treatments of thematic problems or literary or historical movements in French literature. Topic to be determined each semester. Taught in English.

FREN479 Masterworks of French Literature in Translation (3 Credits)
Treats the works of one or more major French writers. Topic to be determined each semester. Taught in English.

FREN480 French Cinema: A Cultural Approach (in Translation) (3 Credits)
A study of French culture, civilization, and literature through the medium of film. Taught in English.Also offered as: FILM420.
Credit Only Granted for: FREN480 or FILM420.

FREN482 Gender and Ethnicity in Modern French Literature (3 Credits)
Literature by women writers of France and other French speaking areas with a focus on the relationship between gender, ethnicity and writing. Taught in English.

FREN488 Special Topics in Francophone Studies (3 Credits)
Topic and language of instruction to be announced when offered.
Repeatable to: 9 credits if content differs.

FREN489 Seminar in Themes or Movements of French Literature (3 Credits)
Seminar on selected themes or movements of French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN495 Honors Thesis Research (3 Credits)
The writing of a paper under the direction of a professor in this department and an oral examination. Required to fulfill the departmental honors requirement.
Restriction: Must be admitted to the departmental honors program.

FREN498 Special Topics in French Literature (3 Credits)
Selected topics in French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN499 Special Topics in French Studies (3 Credits)
An aspect of French studies, the specific topic to be announced each time the course is offered.
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN600 Introduction to Literary Theory (3 Credits)

FREN601 The History of the French Language (3 Credits)

FREN609 Special Topic in the French Language (3 Credits)

FREN611 The Structure of the French Language (3 Credits)
Phonology, morphology, syntax and semantics of modern French. Collection and critical analysis of language data.

FREN619 Special Topic in Medieval French Literature (3 Credits)

FREN629 Special Topic in Sixteenth Century French Literature (3 Credits)

FREN639 Special Topic in Seventeenth Century French Literature (3 Credits)

FREN649 Special Topic in Eighteenth Century French Literature (3 Credits)

FREN659 Special Topic in Nineteenth Century French Literature (3 Credits)

FREN665 The French Theatre in the Twentieth Century (3 Credits)

FREN669 Special Topics in Twentieth Century French Literature (3 Credits)

FREN679 The History of Ideas of France (3 Credits)
Analysis of currents of ideas as reflected in different periods and authors of French literature.

FREN689 Seminar in a Great Literary Figure (3 Credits)

FREN699 Seminar (3 Credits)
Topic to be determined each semester.

FREN709 College Teaching of French (1 Credit)
Introduction to the teaching of French at the college level with particular emphasis on methodology. Seminars in theory, demonstration of different teaching techniques, supervised practice teaching, training in language laboratory procedures, evaluation of instructional materials. Required of all graduate assistants in French.
Repeatable to: 2 credits.

FREN798 Master's Independent Study (1-3 Credits)

FREN799 Master's Thesis Research (1-6 Credits)

FREN818 French Literary Criticism (3 Credits)
Analysis and evaluation of various trends in literary criticism. Topic to be determined each semester.

FREN889 Doctoral Independent Study (3 Credits)

FREN898 Pre-Candidacy Research (1-8 Credits)

FREN899 Doctoral Dissertation Research (1-8 Credits)

GEOG - Geographical Sciences

GEOG413 Migration: Latin America and the United States (3 Credits)
Develops an understanding of the push and pull factors that have contributed to human mobility (migration) that has transformed the Americas. The class is divided in two parts: immigration and emigration from Latin American and Latin America migration to the United States. We will be interested in studying the migration shifts that have occurred in Latin America and the theories that help explain them. The themes that will be addressed are the history of migration with Latin America and to North America, the impact of this migration on both sending and receiving countries, and the various policy strategies and issues concerning migration.
Prerequisite: GEOG313; or permission of BSOS-Geography department.
Recommended: HIST250; or USLT201; or LASC234.
Credit Only Granted for: GEOG413, or GEOG498M.
Formerly: GEOG498M.

GEOG415 Land Use, Climate Change, and Sustainability (3 Credits)
The issues of climate change and land use change as two interlinked global and regional environmental issues and their implications for society and resource use are explored.
Prerequisite: GEOG123 or GEOG306; or permission of BSOS-Geography department.
Recommended: GEOG340; or GEOG342; or GEOG331. Or GEOG201; and GEOG211.
Credit Only Granted for: GEOG415 or GEOG498D.
Formerly: GEOG498D.

GEOG416 Conceptualizing and Modeling Human-Environmental Interactions (3 Credits)
Develops skills to carry out research that integrates environmental and economic aspects of sustainability by introducing extensively used quantitative tools for analyzing human-environmental interactions in the field of ecological economics. These include, e.g., index number calculations and decomposition analysis, Environmental Kuznets Curve (EKC), environmental input-output analysis and life-cycle analysis, and multi-criteria decisions aid (MCDA). Students will need laptops to run models during class.
Prerequisite: Permission of BSOS-Geography department. Or GEOG306, STAT100, MATH107, or MATH111; and (GEOG201 and GEOG202); and (GEOG331 or GEOG330).
Corequisite: MATH130, MATH140, or MATH120; or MATH220.
Credit Only Granted for: GEOG416 or GEOG498N.
Formerly: GEOG498N.

GEOG417 Land Cover Characterization Using Multi-Spectral Remotely Sensed Data Sets (3 Credits)
Students will be introduced to the image processing steps required for characterizing land cover extent and change. Key components of land cover characterization, including image interpretation, algorithm implementation, feature space selection, thematic output definition, and scripting will be discussed and implemented.
Prerequisite: Permission of BSOS-Geography department. Or GEOG372; and GEOG472; and GEOG306. Also offered as: GEOG617.
Credit Only Granted for: GEOG498R; GEOG788R; GEOG417; GEOG617.
Formerly: GEOG498R.

GEOG418 Field and Laboratory Techniques in Environmental Science (1-3 Credits)
Lecture and laboratory learning each week. A variable credit course that introduces field and laboratory analyses in environmental science. Individual learning contract are developed with instructor.
Restriction: Permission of BSOS-Geography department.
Credit Only Granted for: GEOG418 or GEOG448.
Formerly: GEOG448.

GEOG422 Changing Geographies of Sub-Saharan Africa (3 Credits)
Students will develop an understanding of the geographic contexts of SubSaharan Africa, including an overview of the physical, bioclimatic, historical, cultural, political, demographic, health and economic geographies of Sub-Saharan Africa. Students will fill in the map of Africa by studying the spatial distribution within each of these geographic domains. In addition to an overview of geography South of the Sahara, the Congo will be taken as a more intensive case study through additional readings, lectures and discussions.
Prerequisite: Permission of BSOS-Geography department. Or GEOG201; and GEOG202; and (GEOG335 or GEOG333).
Recommended: GEOG130 or GEOG110.
Credit Only Granted for: GEOG328C, GEOG422.
Formerly: GEOG328C.

GEOG423 Latin America (3 Credits)
A geography of Latin America and the Caribbean in the contemporary world: political and cultural regions, population and natural resource distribution, economic and social development, poverty, crime, urbanization, migration trends, and natural disasters.
Prerequisite: Permission of BSOS-Geography department. Or GEOG201 and GEOG202; and (GEOG332, GEOG435, or GEOG333).
Recommended: GEOG130 and GEOG110.
Credit Only Granted for: GEOG313 or GEOG423.
Formerly: GEOG313.

GEOG431 Culture and Natural Resource Management (3 Credits)
Basic issues concerning the natural history of humans from the perspective of the geographer. Basic components of selected behavioral and natural systems, their evolution and adaptation, and survival strategies.
Credit Only Granted for: GEOG421 or GEOG431.
Formerly: GEOG421.

GEOG432 Spatial Econometrics (3 Credits)
An introduction to modern econometric techniques in general and spatial econometrics in particular, using the popular open source statistical computer language R. A focus on using statistical computing to produce analytical reports for real-world applications, research papers, and dissertations.
Prerequisite: Permission of BSOS-Geography department. Or GEOG201; and GEOG202; and GEOG306; and GEOG332. Also offered as: GEOG732.
Credit Only Granted for: GEOG498E, GEOG432, GEOG788E, GEOG732.
Formerly: GEOG498E.

GEOG437 Political Geography (3 Credits)
Geographical factors in the national power and international relations; an analysis of the role of geopolitics and geostrategy, with special reference to the current world scene.
Credit Only Granted for: GEOG423 or GEOG437.
Formerly: GEOG423.

GEOG438 Seminar in Human Geography (3 Credits)
Selected topics in human geography.
Recommended: GEOG201; or GEOG211.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG441 The Coastal Ocean (3 Credits)
Introduction to coastal oceanography, focusing on the physical, biological, and geological aspects of ocean areqs on the inner continental shelves. Wave, currents, and tidal dynamics of bays, open coast, estuaries, and deltas. Sedimentary environments of major coastal types. Ecology and biogeochemical relationships, including benthic and planktonic characteristics. Coastal evolution with sea level rise. Human impacts: eutrophication, modification of sedimentation. The coastal future: rising sea level, hypoxia, and increased storminess.
Prerequisite: GEOG140; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.
Credit Only Granted for: GEOG441 or GEOG498C.
Formerly: GEOG498C.

GEOG442 Biogeography and Environmental Change (3 Credits)
Biogeographical topics of global significance, including a consideration of measurement techniques, and both descriptive and mechanistic modeling. Topics may include: scale in biogeography, biodiversity, carbon geography, climate and vegetation, interannual variability in the biosphere, land cover, global biospheric responses to climate change, NASA's Mission to Planet Earth and Earth Observation System. The class focuses on both natural and athropogenic controls, impacts of biography on climate and ecosystem services and different methods in biogeography.
Prerequisite: GEOG301. And GEOG201 and GEOG211; or permission of BSOS-Geography department. Also offered as: GEOG642.
Credit Only Granted for: GEOG642, GEOG442, GEOG447, or GEOG484.
Formerly: GEOG447.

GEOG458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

GEOG472 Remote Sensing: Digital Processing and Analysis (3 Credits)
Digital image processing and analysis applied to satellite and aircraft land remote sensing data. Consideration is given to preprocessing steps including calibration and geo registration. Analysis methods include digital image exploration, feature extraction thematic classification, change detection, and biophysical characterization. One or more application examples may be reviewed.
Prerequisite: GEOG372 and GEOG306; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: GEOG472 or GEOG480.
Formerly: GEOG480.

GEOG473 Geographic Information Systems and Spatial Analysis (3 Credits)
Analytical uses of geographic information systems; data models for building geographic data bases; types of geographic data and spatial problems; practical experience using advanced software for thematic domains such as terrain analysis, land suitability modeling, demographic analysis, and transportation studies.
Prerequisite: GEOG306 and GEOG373; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: GEOG473 or GEOG482.
Formerly: GEOG482.

GEOG475 Computer Cartography (3 Credits)
Advanced skills of computer mapping using more sophisticated software packages. Map projection evaluation and selection, coordinate system conversion, techniques of quantitative thematic mapping, map design and generalization, hypermedia and animated cartography. Emphasis on designing and making cartographically sound sophisticated thematic maps.
Prerequisite: GEOG373 and GEOG306.
Credit Only Granted for: GEOG471 or GEOG475.
Formerly: GEOG471.

GEOG476 Object-Oriented Computer Programming for GIS (3 Credits)
Expands on conceptual and practical aspects of programming for geographic applications. The main focus of this course is to provide students more advanced programming in object oriented programming languages (i.e. Python). In addition, students will develop a proficiency in applying these advanced programming principles to manipulating spatial data sources within the Geographic Information Systems (GIS).
Prerequisite: GEOG373 and GEOG376; or permission of BSOS-Geography department. And must have completed MATH220; or must have completed or be concurrently enrolled in MATH120, MATH130, or MATH140.
Restriction: Must be in Geography program; or must be in GIS minor.
Credit Only Granted for: GEOG498G or GEOG476.
Formerly: GEOG498G.

GEOG477 Mobile GIS Development (3 Credits)
Designed as an introduction to mobile GIS, to the programming concepts underlying mobile GIS development, and more importantly, to the design and implement of a mobile GIS application. Covers how to develop, test, and publish mobile GIS native apps working across two mobile platforms: Android and iOS. This course will also try to leverage the capabilities of JavaScript, Swift, Google maps, ArcGIS Server and runtime SDK to developing and publishing mobile GIS web apps.
Prerequisite: GEOG306, GEOG373, and GEOG376; and (GEOG473, GEOG475, or GEOG476). And MATH140 or MATH120; or must have completed MATH220.
Restriction: Must be in a major within the BSOS-Geography department; or permission of BSOS-Geography department.
Credit Only Granted for: Geog477 or Geog498V.
Formerly: Geog498V.

GEOG498 Topical Investigations (1-3 Credits)
Independent study under individual guidance.
Prerequisite: Restricted to advanced undergraduate students; and 24 credits in GEOG courses. Or restricted to graduate students.
Repeatable to: 6 credits if content differs.

GEOG603 Masters Research Tutorial (3 Credits)
Development of Masters scholarly paper topic, critical literature review, formulation of geographical approach to research methodology. Individual meetings with faculty. Comprehensive exam before the end of the semester.
Prerequisite: GEOG600.
Restriction: Permission of BSOS-Geography department.
Credit Only Granted for: GEOG603 or GEOG610.
Formerly: GEOG610.

GEOG606 Quantitative Spatial Analysis (3 Credits)
Multivariate statistical method applications to spatial problems. Linear and non-linear correlation and regression, factor analysis, cluster analysis. Spatial statistics including: trend surfaces, sequences, point distributions. Applications orientation.
Prerequisite: GEOG305; or permission of BSOS-Geography department.
Credit Only Granted for: GEOG605 or GEOG606.
Formerly: GEOG605.

GEOG608 Comprehensive Portfolio Assessment Summary (1-3 Credits)
Evaluation of a PhD student's portfolio.
Repeatable to: 3 credits.

GEOG609 Seminar in Remote Sensing (3 Credits)
Topics in Remote Sensing: These may include agricultural, forestry, coastal environments, urban environments, and other major applications of remote sensing. Also may focus on new and existing earth observation missions dedicated to land research.
Prerequisite: GEOG480.
Repeatable to: 6 credits if content differs.

GEOG614 Human Dimensions of Global Change (3 Credits)
The intersection of human and biophysical systems from the vantage point of the impact of human actions on the environment are examined. The impact of the biophysical environment on humans is also discussed.

GEOG615 Land Cover and Land Use Change (3 Credits)
This class provides an examination of land cover and land use change science, addressing the causes, impacts and projection of change. Key concepts of land use science are presented and recent research papers and case studies are reviewed. Class consists of lectures, invited presentations and individual student projects and presentations.
Prerequisite: GEOG442, GEOG472, GEOG435, or GEOG473; or permission of BSOS-Geography department.

GEOG617 Land Cover Characterization Using Multi-Spectral Remotely Sensed Data Sets (3 Credits)
Students will be introduced to the image processing steps required for characterizing land cover extent and change. Key components of land cover characterization, including image interpretation, algorithm implementation, feature space selection, thematic output definition, and scripting will be discussed and implemented.
Prerequisite: Permission of BSOS-Geography department. Or GEOG372; and GEOG472; and GEOG306. Also offered as: GEOG417.
Credit Only Granted for: GEOG498R; GEOG788R; GEOG417; GEOG617.
Formerly: GEOG788R.

GEOG618 Seminar in Geomorphology (3 Credits)
Selected topics; this can include discussion of empirical and theoretical research methods applied to geomorphological problems including review of pertinent literature.

GEOG628 Seminar in Climatology (3 Credits)
Selected topics in climatology chosen to fit the individual needs of advanced students.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG630 Climate, Energy, and Policy (3 Credits)
Students will learn about climate change and energy policy from multiple perspectives including social economic, technological, scientific, and behavioural aspects and their interdependence. The course will also consider the report of the Intergovernmental Panel on Climate Change on mitigation and applied cost/benefit analysis of Climate Change.
Prerequisite: Permission of BSOS-Geography department; or enrolled in the Geographical Sciences Graduate Program(s).
Credit Only Granted for: GEOG430, GEOG630, or GEOG788E.
Formerly: GEOG788E.
Additional Information: This course will make occasional use of the popular open source statistical computer language R for practical workshops.

GEOG632 Economic Geography (3 Credits)
An advanced graduate level introduction to the effects of geography on economic activities and the effects of economic incentives, institutions, and activities on the nature and sustainability of human and environmental geographic systems.
Restriction: Permission of BSOS-Geography department.

GEOG636 Qualitative Methods in Geography (3 Credits)
Use of qualitative methods for qualitative geographic research. Design procedures and analysis of qualitative studies are the focus of the course. Includes readings and trying out various methods. Students will be able to present their own research and use it as an example throughout the course.
Restriction: Permission of BSOS-Geography department.
Formerly: GEOG648C.

GEOG638 Seminar in Biogeography (3 Credits)
Topics in Biogeography: Biological aspects of Geography. These may include ecology, biodiversity, climate-vegetation interactions, impacts of global change.
Prerequisite: Must have completed 6 credits of biogeography or ecology; or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits if content differs.

GEOG639 Seminar in Physical Geography (3 Credits)
Examination of selected themes and problems in physical geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG642 Biogeography and Environmental Change (3 Credits)
Biogeographical topics of global significance, including a consideration of measurement techniques, and both descriptive and mechanistic modeling. Topics may include: scale in biogeography, biodiversity, carbon geography, climate and vegetation, interannual variability in the biosphere, land cover, global biospheric responses to climate change, NASA's Mission to Planet Earth and Earth Observation System. The class focuses on both natural and athropogenic controls, impacts of biography on climate and ecosystem services and different methods in biogeography.
Restriction: Permission of BSOS-Geography department. Also offered as: GEOG442.
Credit Only Granted for: GEOG788C, GEOG642, or GEOG442.
Formerly: GEOG788C.

GEOG648 Seminar in Cultural Geography (3 Credits)
Examination of selected themes and problems in cultural geography.
Repeatable to: 6 credits if content differs.

GEOG652 Digital Image Processing and Analysis (3 Credits)
Digital image processing and analysis applied to satellite and aircraft land remote sensing data. Consideration is given to preprocessing steps including calibration and geo registration. Analysis methods include digital image exploration, feature extraction thematic classification, change detection, and biophysical characterization. One or more application examples may be reviewed.
Prerequisite: GEOG579 or GEOG506; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in M.Prof.Studies: Geospatial Information Sciences (Master's) program; or must be in the Geospatial Information Sciences (Graduate Certificate) program.

GEOG653 Spatial Analysis (3 Credits)
Methods of spatial analysis including measuring aspects of geometric features and identifying spatial patterns of geospatial objects that are represented as point, line, network, areal data, and 3-D surfaces.
Prerequisite: GEOG579 or GEOG506; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in M.Prof.Studies: Geospatial Information Sciences (Master's) program; or must be in the Geospatial Information Sciences (Graduate Certificate) program.

GEOG654 GIS and Spatial Modeling (3 Credits)
Provide foundations and understanding on various issues related to modeling and simulation in GIS context. It will addresses the concepts, tools, and techniques of GIS modeling, and presents modeling concepts and theory as well as provides opportunities for hands-on model design, construction, and application. The focus will be on raster-based modeling. This course is also application-orientated, particularly in these fields such as terrain modeling, LULC modeling, hydrological modeling, suitability modeling, etc.
Prerequisite: GEOG653.
Restriction: Must be in M.Prof.Studies: Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Professional Studies-Geospatial Information Sciences.

GEOG655 Spatial Database (3 Credits)
This course is designed to help students understand, analyze, design, and implement spatial databases. While the basic concepts and theories of database will be introduced, the focus of this course will be on providing students with hands-on experiences to practice the technical skills used in spatial database design and implementation. SQL, Oracle, and ArcSDE are the key topics.
Prerequisite: GEOG653.
Restriction: Must be in M.Prof.Studies: Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Professional Studies-Geospatial Information Sciences.

GEOG656 Programming and Scripting in GIS (3 Credits)
An introduction to programming and scripting for intermediate GIS users. The fundamental concepts of computer programming will be introduced within the Geoprocessing framework in ArcGIS primarily using Python. Basic concepts of object-oriented programming and scripting will be presented. Students will develop skills in programming techniques to explore, manipulate and model spatial data using the Geoprocessor methods.
Prerequisite: GEOG653.
Restriction: Must be in M.Prof.Studies: Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Professional Studies-Geospatial Information Sciences.

GEOG657 Web Programming (3 Credits)
Intermediate course designed to teach students the techniques for Web development, particularly creating dynamic and data-driven Web applications. Introduces a high-level, object-oriented programming language such as VB.Net and the designing, coding, debugging, testing, and documenting for the development of Web-based applications. Other popular Web development tools such as DHTML, CSS and PHP are also covered.
Prerequisite: GEOG653.
Restriction: Must be in M.Prof.Studies: Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Geospatial Information Sciences program.
Credit Only Granted for: GEOG657 or GEOG788R.
Formerly: GEOG788R.

GEOG658 Seminar in Historical Geography (3 Credits)
An examination of themes and problems in historical geography with reference to selected areas.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG660 Advanced Remote Sensing Using Lidar (3 Credits)
Lidar, also known as laser scanning, is an active remote sensing tool that can produce high-resolution point clouds. Lidar is being applied to problems such as terrain modeling, biomass estimation, change detection, feature extraction, and measuring tree canopy. Topics covered are fundamentals of lidar, current developments in lidar technology, and different applications where lidar is being used. Students will get hands-on learning about lidar data management, processing, and analysis.
Prerequisite: GEOG652.
Recommended: GEOG656 and GEOG654.
Credit Only Granted for: GEOG660 or GEOG788G.
Formerly: GEOG788G.

GEOG661 Fundamentals of Geospatial Intelligence (3 Credits)
Geospatial Intelligence (GEOINT) is the collection, analysis, visualization and dissemination of geospatial information to support decision-making. This course introduces the fundamental knowledge required to become a successful GEOINT practitioner, including the history of the GEOINT discipline, the intelligence applications of remote sensing and Geographic Information Systems (GIS) technologies, and how GEOINT products are used to support national security and humanitarian missions. Upon completion of this course you will understand the roles that technology, policy, doctrine, government, and industry play in shaping the Geospatial Intelligence discipline, and develop the technical knowledge and domain expertise to create basic GEOINT products that provide context for decision makers.

GEOG662 Advances in GIS and Remote Sensing (3 Credits)
Focuses on state-of-the-art advances in geographic information science and remote sensing as they support geospatial intelligence. Focus on synergies between GIS and remote sensing in informatics, computer science, and spatial engineering, and their application to problem domains in human systems, physical systems, and cyberspace. Advances in GIS presents recent advances regarding fundamental issues of geo-spatial information science (space and time, spatial analysis, uncertainty modeling and geo-visualization), and new scientific and technological research initiatives for geo-spatial information science (such as spatial data mining, mobile data modeling, and location-based services). Advances in remote sensing will provide opportunity to understand and work with latest developments in the Remote Sensing datasets. The curriculum covers wide range of remote sensing data interpretation and their processing techniques.
Restriction: Students taking the course must be familiar with data structures, basic GIS and RS concepts, and demonstrate basic understanding of using GIS and RS software. And must be enrolled in Geographical Sciences MPS or graduate certificate program; or permission of BSOS-Geography department.

GEOG663 Big Data Analytics (3 Credits)
Designed to introduce statistical analysis over big data sets (and tackling big data problems), primarily in geography and spatial sciences, but with broader appeal throughout the socio-behavioral sciences. Students will be introduced to a range of methods that can be applied to the exploration, modeling, and visualization of big quantitative data. This course explores data fusion, statistical analysis, and data-mining for geospatial and non-geospatial data in structured and unstructured form, with an emphasis on large silos of data across diverse sources and assumptions. Topics will include open sourcing, metadata schemes, data standards and models, data-access, data-mining, clustering methods, classifiers, data reduction, machine learning, filtering schemes, real-time and streaming data, archiving and preservation, and handling uncertainty.
Recommended: Students taking the course must be familiar with data structures, basic GIS and RS concepts, and demonstrate basic understanding of using GIS and RS software.
Restriction: Permission of BSOS-Geography department; or must be enrolled in Geographical Sciences MPS or graduate certificate program.

GEOG664 GEOINT Systems and Platforms (3 Credits)
There are numerous systems and platforms that support the collection, visualization and dissemination of Geospatial Intelligence (GEOINT). Platforms such as satellites and aircraft carry sensors systems that can detect both physical and man-made objects on the earth. Ground-based processing systems are used to analyze and visualize sensor data, and also to create and disseminate GEOINT products that guide decision-making. In this course you will learn how to develop and implement source-to-screen GEOINT workflows, and will understand how to use a system of systems approach to describe the programmatic and technical strengths and weaknesses of many different GEOINT systems and platforms.

GEOG665 Algorithms for Geospatial Intelligence Analysis (3 Credits)
Exposes students to fundamental algorithms in geospatial intelligence and their application in methodological and substantive domains, and their implementation in computer programs and software systems. Current topics include spatial and space-time analysis, cartographic transformations, data compression and reduction, MapReduce and distributed data access, genetic algorithms, clustering and indexing algorithms, filtering algorithms, geometry and tessellation algorithms, routing algorithms, localization algorithms, and complexity and scaling. Implementation of algorithms will be explored through pseudo-code and a variety of scripting, data access, and programming languages.
Recommended: Students taking the course must be familiar with data structures, basic GIS and RS concepts, and demonstrate basic understanding of using GIS and RS software.
Restriction: Permission of BSOS-Geography department; or must be enrolled in Geographical Sciences MPS or graduate certificate program.

GEOG668 Seminar in Economic Geography (3 Credits)
Examination of themes and problems in the field of economic geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG670 Open Source GIS (3 Credits)
An exploration of techniques for using Free and Open Source Software for GIS (FOSS4g) from conception to final presentation of results. Advanced concepts and techniques including enterprise GIS, spatial SQL, parallel processing, and displaying the results of GIS analysis over the Internet will also be covered.
Credit Only Granted for: GEOG670 or GEOG788A.
Formerly: GEOG788A.
Additional Information: Students do not need any experience using open source GIS, but students are expected to be comfortable using a desktop GIS such as ArcGIS.

GEOG671 Remote Sensing Instruments and Observtions (3 Credits)
Detailed examination of land remote sensing instruments, observatories and resultant measurements in the optical portion of the EM spectrum. Includes computer-based exercises that examine the importance of data geo-registration and radiometric calibration in land measurements.
Prerequisite: GEOG472; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.

GEOG672 Biophysics of Optical Remote Sensing (3 Credits)
Biophysical principles, phenomena and processes underlying multispectral remote sensing in the optical portion of the EM spectrum. Includes computer-based exercises that explore the biophysical basis of land patterns and dynamics observed in remote sensing data.
Prerequisite: GEOG472; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.

GEOG673 GIS Modeling (3 Credits)
Process modeling and spatial analysis within the GIS context. Introducestheoretical fundamentals and conceptual approaches to frame and represent geographical phenomena and spatial decision making.
Prerequisite: GEOG306 and GEOG473; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: GEOG673 or GEOG695.
Formerly: GEOG695.

GEOG674 GIS Spatial Databases (3 Credits)
Introduces fundamental concepts and practical skills required to design, implement and use GIS databases. Students will learn to store and represent geospatial data in databases, design and create a spatial database, manage and query geospatial data, and deliver and present geospatial data.
Prerequisite: GEOG473; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: GEOG674 or GEOG696.
Formerly: GEOG696.

GEOG676 Advanced Programming for Geography and Remote Sensing (3 Credits)
Comprehensive instruction is provided in the advanced use of a commercial programming language and analysis tool used for scientific programming and data visualization, with an emphasis on applications in geography and remote sensing or GIS.
Prerequisite: GEOG376; or permission of BSOS-Geography department.

GEOG677 Internet GIS (3 Credits)
Online course delivers information on the use of GIS applications on the Internet. Covers hardware/software structure of the Internet, the means for communicaton between Internet-connected devices, applications that provide GIS program and data, and performance and security concerns.
Recommended: GEOG676.
Restriction: Permission of BSOS-Geography department.

GEOG679 Seminar in Urban Geography (3 Credits)
Post-industrial urbanization; urban planning and management; metropolitan systems; internal structure of the city; use of techniques in urban locational research; transportation and land use.
Repeatable to: 6 credits if content differs.

GEOG681 Introduction to Computational Social Science (3 Credits)
Introduction to Computational Social Science serves as an introduction to the basis for computational social science (CSS) across diverse disciplines and topics at the intersection of the socio-behavioral sciences, physical sciences, and computing sciences. We will explore the foundations for CSS in different subject domains, as the methods used to build representations of social science entities, phenomena, and processes in computational media. We will also critique applied computational social science as it relates to topics that cut across the socio-behavioral sciences, or that specialize within particular socio-behavioral science domains.
Credit Only Granted for: GEOG681 or GEOG788W.
Formerly: GEOG788W.

GEOG686 Mobile GIS and Geocomputing (3 Credits)
An introduction to mobile GIS, to the programming concepts underlying mobile GIS development, and to the design and implementation of a mobile GIS application. Covers how to develop, test, and publish mobile GIS native apps working across two mobile platforms: Android and iOS. Leverages the capabilities of JavaScript, Swift, Google maps, ArcGIS Server and runtime SDK to developing and publishing mobile GIS apps.
Prerequisite: Permission of BSOS-Geography department; or must be enrolled in Geographical Sciences MPS or graduate certificate program.
Recommended: Students taking the course must be familiar with data structures, basic GIS concepts, and demonstrate basic understanding of object-oriented programming under GIS environment.
Credit Only Granted for: GEOG477, GEOG498V, GEOG788V or GEOG777.
Additional Information: Tablets that run android and iOS will be loaned to registered students at no cost.

GEOG694 Computerized Map Projections and Transformations (3 Credits)
Computer generated projections; techniques for transforming one coordinate system to another; software for producing different map projections; mathematical and perceptual problems in producing and using projections.
Prerequisite: GEOG694; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.

GEOG698 Seminar in Cartography (1-6 Credits)
Selected topics; this can include: forensic cartography, tactile maps, design with new technologies, perception and cognitive mapping, history of cartography, laboratory management.
Repeatable to: 6 credits if content differs.

GEOG699 Seminar in Computer Cartography (3 Credits)
Selected topics in computer-assisted cartography: algorithms for linear generalization, containing three-dimensional mapping and continuous-time mapping.
Prerequisite: GEOG373; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG718 Seminar in Integrative Studies (3 Credits)
Selected topics integrating various areas of study within the field of geography and/or related disciplines.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG732 Spatial Econometrics (3 Credits)
An introduction to modern econometric techniques in general and spatial econometrics in particular, using the popular open source statistical computer language R. A focus on using statistical computing to produce analytical reports for real-world applications, research papers, and dissertations.
Prerequisite: Permission of BSOS-Geography department. Or GEOG201; and GEOG306; and GEOG202; and GEOG332. Also offered as: GEOG432.
Credit Only Granted for: GEOG498E, GEOG432, GEOG788E, GEOG732.
Formerly: GEOG498E, GEOG788E.

GEOG738 Seminar in Human Geography (3 Credits)
Selected topics in human geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG748 Seminar in Physical Geography (3 Credits)
Selected topics in physical geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG749 Seminar in Biogeography (3 Credits)
Selected topics in biogeography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG777 Mobile GIS Development (3 Credits)
Designed as an introduction to mobile GIS, to the programming concepts underlying mobile GIS development, and more importantly, to the design and implementation of a mobile GIS application. Covers how to develop, test, and publish mobile GIS native apps working across two mobile platforms: Android and iOS. This course will also try to leverage the capabilities of JavaScript, Swift, Google maps, ArcGIS Server and runtime SDK to developing and publishing mobile GIS web apps.
Prerequisite: Permission of BSOS-Geography department; or must be enrolled in Geographical Sciences Phd or MS degree program.
Restriction: Must be in a major within the BSOS-Geography department; or permission of BSOS-Geography department.
Credit Only Granted for: GEOG477, GEOG498V, GEOG788V or GEOG777.
Formerly: GEOG788V.

GEOG778 Seminar in Remote Sensing (3 Credits)
Selected topics in remote sensing.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG779 Seminar in Geographic Information Science (3 Credits)
Selected topics in geographic information science.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG788 Selected Topics in Geography (1-3 Credits)
Readings and discussion on selected topics in the field of geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 12 credits if content differs.

GEOG789 Independent Readings (1-3 Credits)
Independent reading as arranged between a graduate faculty member and graduate student.
Repeatable to: 6 credits if content differs.

GEOG790 Internship in Geography (3 Credits)
Field experience in the student's specialty in a Federal, state, or local agency or private business. Research paper required.

GEOG792 Teaching Assistant Seminar (1 Credit)
GEOG 792 - Guidance and instruction for incoming and future teaching assistants.

GEOG795 Professional Practices Seminar (1 Credit)
Development and preparation of a resume, selecting and helping reference writers, conducting successful interviews, negotiating an employment package, giving professional presentations, proposal prepartion, writing reports, codes of ethics and responsibilities. Presentations from practitioners in GIS field. Basic project management skills and strategies in preparation for professional project.
Restriction: Must be in M.Prof.Studies: Geospatial Information Sciences (Master's) program.

GEOG796 GIS Project Management (3 Credits)
Project management methodology is covered, emphasizing implementing and integrating GIS into broader projects. Topics include project initiation, planning, scope, scheduling, budgeting and risk management.
Prerequisite: GEOG653, GEOG652, and GEOG606.
Restriction: Must be in M.Prof.Studies: Geospatial Information Sciences (Master's) program; or must be in the Geospatial Information Sciences (Graduate Certificate) program.
Credit Only Granted for: GEOG796 or INFM706.
Formerly: INFM706.

GEOG797 Professional Project (3 Credits)
Data and materials can originate from an internship (internal or external) or from relevant work experience with current employer. Under direction of faculty advisor, students will prepare a project report containing explanation of the requirements for the work, technical account of the activities undertaken, including literature review, description of methods and approaches taken, a critical discussion of results, along with conclusions and recommendations developed from the project. Final project will consist of a full-fledged GIS application that is up and running and can be tested, providing potential employers with a portfolio demonstrating student's ability to manage and develop a GIS application in real world situations.
Prerequisite: GEOG795; and must have completed or be concurrently enrolled in ENCE662.
Restriction: Must be in M.Prof.Studies: Geospatial Information Sciences (Master's) program.

GEOG798 Selected Topics in Geography: Seminar Series (1 Credit)
Readings and discussions on selected topics in the field of geography.
Repeatable to: 6 credits if content differs.

GEOG799 Master's Thesis Research (1-6 Credits)

GEOG898 Pre-Candidacy Research (1-8 Credits)

GEOG899 Doctoral Dissertation Research (1-8 Credits)

GEOL - Geology

GEOL412 Geology of the Terrestrial Planets (3 Credits)
Geological features of Mercury, Venus, Mars and the Moon with an emphasis on results from recent NASA planetary mission. Topics include interior structure, impact cratering, tectonic and volcanic history, surface conditions, climate change, and habitability.
Prerequisite: GEOL341 or GEOL340.
Credit Only Granted for: GEOL489A or GEOL412.
Formerly: GEOL489A.

GEOL423 Optical Mineralogy (4 Credits)
The optical behavior of crystals with emphasis on the theory and application of the petrographic microscope.
Prerequisite: GEOL100 or GEOL120; and GEOL110; and GEOL322. And CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL431 Vertebrate Paleobiology (4 Credits)
A survey of the evolution of the vertebrates, encompassing information from the diversity of living members, but concentrating on the contribution of the fossil record. Emphasis is on the phylogenetic systematics, comparative and functional anatomy, developmental biology, and stratigraphic distribution of major extinct and extant groups.
Prerequisite: BSCI207, BSCI392, GEOL104, GEOL204, or GEOL331; or permission of CMNS-Geology department.

GEOL435 Environmental Geochemistry (3 Credits)
An understanding of geochemical cycles of Earth's surface systems including soils, rivers, lakes, and estuaries and causes and implications of alteration of geochemical cycles. Topics include chemical weathering, soils, chemical composition of inland waters, hydrologic tracers, salinization, eutrophication, nutrient and metal pollution, and global geochemical cycles.
Prerequisite: MATH115; and (GEOL100 or GEOL120); and (GEOL436 or GEOL444). And CHEM131 and CHEM132; or (CHEM135 and CHEM136).
Restriction: Nondegree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL489W or GEOL435.
Formerly: GEOL489W.

GEOL436 Principles of Biogeochemistry (3 Credits)
An introduction to the basic principles of biogeochemistry including aspects of organic geochemistry, biochemistry, microbiology, global geochemical cycles, the origin of life and paleoenvironmental evolution.
Prerequisite: MATH140 or MATH120; or must have completed MATH220. And GEOL100 or GEOL120; or GEOL322. And CHEM131 and CHEM132; or (CHEM135 and CHEM136).
Restriction: Non-degree-seeking students require the permission of the instructor. Also offered as: AOSC436.
Credit Only Granted for: GEOL436 or AOSC436.

GEOL437 Global Climate Change: Past and Present (3 Credits)
Introduction to the processes by which climate varies, the paleoclimate record, and projections of climate change into the 21st century, including discussion of climate sensitivity to external radiative forcing.
Prerequisite: MATH115 or MATH140; and (GEOL100 or GEOL120); and (CHEM131 or CHEM135); and (CHEM132 or CHEM136).

GEOL443 Petrology (4 Credits)
Study of igneous and metamorphic rocks: petrogenesis, distributions, chemical and mineralogical relations, macroscopic and microscopic descriptions, geologic significance.
Prerequisite: GEOL322. And CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103. And must have completed or be concurrently enrolled in GEOL423; and (GEOL100 or GEOL120); and GEOL110.
Corequisite: Permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL444 Low Temperature Geochemistry (4 Credits)
Basic chemical principles, thermodynamics, and kinetics of low-temperature inorganic and organic geochemical reactions in a wide range of surface environments. These geochemical tools will be used to provide a context for understanding elemental cycling and climate change. Laboratories will include problem sets as well as wet chemical and mass spectrometric techniques used in low temperature geochemistry.
Prerequisite: GEOL322, GEOL100, and MATH115. And CHEM103; or (CHEM131 and CHEM132); or (CHEM135 and CHEM136).
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL445 High Temperature Geochemistry (4 Credits)
Review of chemical principles and their use in understanding processes of Earth, and solar system formation and differentiation. Topics include nucleosynthesis and cosmochemical abundances of elements, bonding and element partitioning, equilibrium thermodynamics and phase stabilities, radiogenic isotopes and geochronology, kinetics, and diffusion.
Prerequisite: GEOL322, GEOL100, and MATH115. And CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL446 Geophysics (3 Credits)
An introduction to modern geophysics. Topics include: global plate tectonics, plate motion, triple junctions, geomagnetism, earthquakes and faulting, reflection and refraction seismology, gravity and isostasy, heat flow and mantle dynamics, deep interior of the Earth, geophysical observations and measurements.
Prerequisite: PHYS141, MATH141, and MATH140; and (GEOL100 or GEOL120).
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL447 Observational Geophysics (3 Credits)
An introduction to practical signal processing, data analysis, and inverse theory in geophysics.
Prerequisite: MATH140 and MATH141; and (PHYS141, PHYS161, or PHYS171).

GEOL451 Groundwater (3 Credits)
An introduction to the basic geologic parameters associated with the hydrologic cycle. Problems in the accumulation, distribution, and movement of groundwater will be analyzed.
Prerequisite: GEOL110 and MATH140; and (GEOL120 or GEOL100); and (CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103). Or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor; and junior standing or higher.

GEOL452 Watershed and Wetland Hydrology (3 Credits)
Physical processes by which water moves in watershed and wetland systems. Topics include: precipitation, infiltration, flow in the unsaturated zone, streamflow generation processes, and groundwater flow.
Prerequisite: Permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor; and junior standing or higher.

GEOL453 Ecosystem Restoration (3 Credits)
Overview of ecosystem functions across biomes/geologic settings, and considerations and tradeoffs in ecosystem restoration strategies. Specific case studies and discussions will be aimed at understanding how structure can influence biophysical and biogeochemical processes supporting ecosystems, and then describes how rates, timing, and location of physical, chemical, and ecosystem processes can be altered by different restoration strategies to enhance ecosystem services.
Prerequisite: MATH120 or MATH140; or must have completed MATH220. And (CHEM131 or CHEM135); and (CHEM132 or CHEM136); and (GEOL100, GEOL120, or ENST200).
Restriction: Junior standing or higher; and permission of instructor is required of non-degree-seeking students.
Credit Only Granted for: GEOL453 or GEOL489L.
Formerly: GEOL489L.

GEOL455 Marine Geophysics (3 Credits)
Plate tectonics, earthquakes and faulting, isostasy and gravity, heat and mantle dynamics, ocean ridges and transform faults, hydrothermal vents, trenches and oceanic islands, subduction zones, accretionary and erosion wedges, sedimentary basins and continental rifts. Exploration of the oceans using geophysical methods.
Prerequisite: MATH141 and MATH140; and (GEOL120 or GEOL100). Or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL455 or GEOL489E.
Formerly: GEOL489E.

GEOL456 Engineering Geology (3 Credits)
An overview of engineering geology with an emphasis on physical understanding of natural hazards and natural resources. General theories of stress and strain, failure criteria, frictional stability, fluid flow in porous media and poroelasticity are introduced. Quantitative approaches on earthquakes, landslides, land subsidence, and geotechnical aspects of oil/gas exploration are discussed.
Prerequisite: PHYS141 and MATH141; and (GEOL120 or GEOL100). Or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL456 or GEOL489Z.
Formerly: GEOL489Z.

GEOL457 Seismology (3 Credits)
General overview of the basics of seismology, starting with wave propagation, seismic reflection and refraction. Applications to the determination of the seismic velocity and anisotropy structure of the Earth. Earthquake generation, postseismic deformation and creep events, relation to faulting and plate tectonics.
Prerequisite: GEOL120 or GEOL100; and (MATH141, GEOL110, and MATH140). Or permission of CMNS-Geology department.
Recommended: PHYS171, PHYS141, or PHYS161.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL457 or GEOL489A.
Formerly: GEOL489A.

GEOL460 Field Geophysics (4 Credits)
Students will become familiar with geophysical instrumentation used for both scientific and industrial applications. Students will be given an introduction to the use of geophysical instrumentation for data collection, processing, and analysis, design of field experiments for investigating field geophysical problems, and an introduction to the theory of instrument design and use. Instruments that will be covered include (but are not limited to): broadband seismometers, geophones, ground-penetrating radar, magnetotellurics, and Global Positioning Satellites.
Prerequisite: MATH140, MATH141, and GEOL446; and (PHYS141, PHYS161, or PHYS171).
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL463 Economic Geology (3 Credits)
The geological setting, and mineralogy of ore bodies, as well as the chemical and physical factors affecting the source, transport and deposition of metallic ores, petroleum and natural gas will be covered. The economics of mineral resources will be discussed.
Prerequisite: GEOL322; and (CHEM131 or CHEM135); and (CHEM132 or CHEM136).
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL489Q or GEOL463.
Formerly: GEOL489Q.

GEOL471 Geochemical Methods of Analysis (3 Credits)
Principles and application of geochemical analysis as applied to a variety of geological problems. X-ray and optical spectroscopy, X-ray diffraction, atomic absorption, electron microprobe, and electron microscopy.
Prerequisite: CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL472 Tectonics (3 Credits)
Study of the development of the lithosphere on Earth and other rocky planets and moons. Emphasis on student-led discussions. Improvement of scientific writing.
Prerequisite: GEOL120 or GEOL100; and (GEOL102, GEOL341, and GEOL110). Or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL473 Origin and Evolution of the Continents (3 Credits)
Introduction to current theories regarding the origin and evolution of the continents. Emphasis on development of critical reading and reasoning skills, and improvement of verbal and written communication.
Prerequisite: GEOL445 and GEOL443; or permission of instructor.
Restriction: Non-degree-seeking students require the permission of the instructor.
Formerly: GEOL489I.

GEOL488 Geology Colloquium (1 Credit)
Contemporary research topics and issues in geosciences are explored through the weekly Geology departmental colloquium and discussion of its contents.
Prerequisite: At least one 300 or 400-level Geology course of at least 3 credits.
Restriction: May not be taken concurrently with GEOL497 or GEOL497H.
Repeatable to: 4 credits.

GEOL489 Special Topics (3 Credits)
Recent advances in geology.
Prerequisite: Must have completed at least 2 upper-level GEOL courses plus one additional GEOL course.
Corequisite: GEOL393.
Restriction: Must be in Geology program; and junior standing or higher.

GEOL490 Geology Field Camp (6 Credits)
Intense field geology course taught off campus during the summer. Students describe and compile maps of formations and structures from outcrops, subsurface, and remotely sensed data. Special fees required.
Prerequisite: GEOL341 and GEOL443.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL491 Environmental Geology Field Camp (3-6 Credits)
Intensive field course designed for students of environmental geology. Students will learn to make maps, to describe soil profiles and site characteristics, to monitor hydrologic and groundwater conditions, and to measure geologic structures and stratigraphic sections.
Prerequisite: GEOL341, GEOL342, and GEOL451; or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL490 or GEOL491.

GEOL497 Recent Advances: Geology (3 Credits)
A survey of important recent advances in geological sciences in the context of the methods and practices of scientific research.
Prerequisite: Must have completed at least 2 upper-level GEOL courses.
Corequisite: GEOL393; and a third upper-level geology course.
Restriction: Must be in Geology program; and GPA of 3.0 or better in both overall and in all courses required for the major; and senior standing; and to be taken as late as possible in the program.
Credit Only Granted for: GEOL497 or GEOL489H.
Formerly: GEOL489H.

GEOL499 Special Problems in Geology (1-3 Credits)
Intensive study of a special geologic subject or technique selected after consultation with instructor. Intended to provide training or instruction not available in other courses which will aid the student's development in his or her field of major interest.
Prerequisite: (GEOL120 or GEOL100; and (GEOL102 and GEOL110)); or students who have taken courses with comparable content may contact the department. And permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL612 Geology and Geophysics of the Terrestrial Planets (3 Credits)
Geological features of Mercury, Venus, Mars and the Moon with an emphasis on results from recent NASA planetary mission. Class is organized to follow geological processes or observation throughout the inner solar system. Topics covered include interior structure, impact cratering, tectonic and volcanic history, surface conditions and climate change.
Prerequisite: Permission of CMNS-Geology department; or (GEOL446 and MATH141).
Recommended: Familiarity with MATLAB or MATHEMATICA.
Credit Only Granted for: GEOL680 or GEOL789A.
Formerly: GEOL789A.

GEOL614 Thermodynamics of Geological Processes (3 Credits)
Thermodynamics and its application to problems in mineralogy, petrology and geochemistry. Systematic development of the laws of thermodynamics and the principles of chemical equilibrium as applied to geological problems.
Prerequisite: PHYS142, GEOL322, and MATH141; and must have completed CHEM113.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL621 Mineralogy of Ore-Forming Sulfides (3 Credits)
A systematic study of chemical compositions, crystal structures, and paragenetic relations of major ore-forming sulfides.
Prerequisite: GEOL322; or students who have taken courses with comparable content may contact the department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL622 Mineralogy of the Rock-Forming Silicates (3 Credits)
A systematic study of the structure, polymorphic relations, composition and phase transformations of the major rock forming silicates.
Prerequisite: CHEM481; or students who have taken courses with comparable content may contact the department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL623 Ore Microscopy (3 Credits)
A systematic study of general principles of reflected light optics and their application to the reflected light polarizing microscope as well as techniques for identifying common ore mineral in polished section.
Prerequisite: GEOL423; and must have completed or be concurrently enrolled in GEOL653.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL635 Environmental Geochemistry (3 Credits)
Geochemical cycles of Earth's surface systems including soils, rivers, lakes, and estuaries and causes; and implications of their alteration. Topics include chemical weathering, soils, chemistry of inland waters, hydrologic tracers, salinization, eutrophication, nutrient and metal pollution, and global geochemical cycles.
Prerequisite: MATH115; and (GEOL100 or GEOL120); and (GEOL436 or GEOL444). And CHEM131 and CHEM132; or (CHEM135 and CHEM136).
Restriction: Nondegree-seeking students require the permission of the instructor. Also offered as: GEOL435.
Credit Only Granted for: GEOL635, GEOL789W, GEOL435 or GEOL489W.
Formerly: GEOL789W.

GEOL636 Ecosystem Restoration (3 Credits)
A further understanding of ecosystem functions across biomes/geologic settings, and developing practical applications in ecosystem restoration strategies through a graduate level project. Specific case studies and discussions will be aimed at understanding how structure can influence biophysical and biogeochemical processes supporting ecosystems, and then describes how rates, timing, and location of physical, chemical, and ecosystem processes can be altered by different restoration strategies to enhance ecosystem services. A project will then be used to apply restoration principles towards solving tangible environmental problems and communication to managers.
Prerequisite: MATH120 or MATH140; and (CHEM131 or CHEM135); and (CHEM132 or CHEM136); and (GEOL100, GEOL120, or ENST200).
Restriction: Equal preference is given to students enrolled in GEOL, MEES, CONS, ENST, AOSC, and civil and environmental engineering graduate programs; and permission of Instructor required for non degree seeking students.
Credit Only Granted for: GEOL453 or GEOL489L.
Formerly: GEOL489L.

GEOL643 Igneous and Metamorphic Petrology (3 Credits)
Study of igneous and metamorphic rocks; environments, conditions and processes of metamorphism and of melting and crystallization.
Prerequisite: GEOL443.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL643 and GEOL789P.
Formerly: GEOL789P.

GEOL644 Metamorphic Petrology (3 Credits)
Analysis of the physical and chemical aspects of metamorphic processes. Suites of metamorphic rocks by the use of chemical, mineralogic, petrographic, and field data.
Prerequisite: GEOL443 and CHEM481.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL646 Crustal Petrology (3 Credits)
An integrated approach to the detailed understanding of the petrology of the earth's continental crust and the processes which act upon it and within it.
Prerequisite: GEOL643 or GEOL644; or permission of instructor.
Recommended: GEOL641.
Restriction: Non-degree seeking students require the permission of the department.

GEOL647 Observational Geophysics (3 Credits)
Introduces graduate students to instrument design and performance, signal processing, data analysis and inverse theory in geophysics.
Prerequisite: MATH140, MATH141, and PHYS141; and (PHYS161 or PHYS171).
Credit Only Granted for: GEOL789O or GEOL647.
Formerly: GEOL789O.

GEOL650 Isotope and Trace Element Geochemistry (3 Credits)
Trace elements and isotopes in geology, including modern applications in geochronology and petrogenesis.
Prerequisite: GEOL443; or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL651 Statistics for Geoscientists (3 Credits)
Practical approach to basic statistics applied in the geosciences. Experimental design, elementary statistics and probability, sequence analysis, spatial analysis, linear regression, nonparametric statistics, bivariate, multivariate and principal components analysis of variance, hypothesis testing. Problem sets and participatory discussion of statistical applications in the current literature.
Prerequisite: MATH115; and non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL789V or GEOL651.
Formerly: GEOL789V.

GEOL652 Advanced Watershed and Wetland Hydrology (3 Credits)
Physical and chemical processes in watershed and wetland systems: with an emphasis on redox reactions.
Prerequisite: GEOL452; or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL653 Advanced Problems in Economic Geology (3 Credits)
A systematic study of particular ore deposit types or areas of mineralization, primarily involving major economically important metals. Geologic setting, mineralogy and form and character of the ore bodies, chemical and physical factors affecting source, transport and deposition of ore forming fluids.
Prerequisite: GEOL453.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL654 Fluvial Geomorphology Seminar (3 Credits)
Fluvial geomorphology is the study of the movement of water and sedimentin stream channels. This includes: formation of channels, open channel hydraulics, sediment transport or bedload and suspended load, river morphology and landscape evolution. The course is designed for graduate students and advanced undergraduates.
Recommended: GEOL452 and GEOL340.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL654 or GEOL789B.
Formerly: GEOL789B.

GEOL655 Marine Geophysics (3 Credits)
An introduction to geophysical aspects of global tectonics. Quantitative geophysical approached are introduced for: past and present plate motions, seismology and interior of the Earth, gravity and isostasy, heat and mantle dynamics. Ocean ridges, hydrothermal vents, transform faults, oceanic core complex, ocean trenches and subduction zones, accretionary anderosion wedges, rift and rift margins, convergence and collisons, sedimentary basins.
Prerequisite: Permission of CMNS-Geology department.
Recommended: GEOL120 or GEOL100; and MATH141.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL655 or GEOL789E.
Formerly: GEOL789E.

GEOL656 Engineering and Environmental Geology (3 Credits)
An overview of mechanical aspects of earthquakes as a result of fault instability. Quantitative approaches on soil and rock strength, instability on earthquakes, landslides, land subsidence, and geotechnical aspects of oil/gas exploration are discussed. Emphasis is on theoretical framework of mechanics of earthquake and faulting, earthquake source mechanisms, earthquake scaling relations, the seismic cycle etc.
Prerequisite: GEOL100, GEOL110, MATH141, and PHYS141; or permission of instructor.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL656 or GEOL789Z.
Formerly: GEOL789Z.

GEOL657 Seismic Wave Propagation (3 Credits)
A description of the physics of seismic wave propagation and their applications to the determination of the structure of the Earth and the mechanics of earthquakes.
Prerequisite: MATH140 and MATH141; and (PHYS141, PHYS161, or PHYS171); and permission of CMNS-Geology department.
Recommended: GEOL100 or GEOL120; and (MATH241 and MATH246); and (PHYS260 or PHYS273).
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL657 or GEOL789A.
Formerly: GEOL789A.

GEOL670 Physical Oceanography (3 Credits)
Ocean observations. Water masses, sources of deep water. Mass, heat, and salt transport, geochemical tracers. Western boundary currents, maintenance of the termocline. Coastal and estuarine processes. Surface waves and tides. Ocean climate.
Prerequisite: Permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor. Also offered as: AOSC420, AOSC670.
Credit Only Granted for: GEOL670, AOSC670 or AOSC420.

GEOL671 Analytical Methods in Mineralogy (3 Credits)
An intensive study in the operation and application of instrumentation in mineralogical problems. Emphasis on designing and testing methods of analysis for use in the student's research problems in geology.
Prerequisite: CHEM471.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL672 Tectonics (3 Credits)
The study of the development of the lithosphere on Earth and other rocky planets and moons. Emphasis on the student led discussion and improvement of scientific writing.
Prerequisite: GEOL341; or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL672 or GEOL789C.
Formerly: GEOL789C.

GEOL680 Geodynamics (3 Credits)
The mechanics and dynamics of the Earth's interior and their applications to problems of Geophysics. This course considers several rheological descriptions of Earth materials (brittle, elastic, linear and nonlinear fluids, and viscoelastic) and emphasizes analytical solutions to simplified problem.
Prerequisite: Permission of CMNS-Geology department; or (MATH241, MATH462, and GEOL446).
Recommended: Familiarity with MATLAB or MATHEMATICA.
Credit Only Granted for: GEOL680 or GEOL789J.
Formerly: GEOL789J.

GEOL681 Physics of Planetary Interiors and Surfaces (3 Credits)
Formation of planets in the solar system; segregation and core formation in terrestrial planets; formation of early atmosphere; tectonics and volcanism; geochemical and cosmochemical constraints; planetary geomorphology.
Prerequisite: Advanced undergraduate geophysics, astronomy or geochemistry; and GEOL446. Or permission of CMNS-Geology department.
Credit Only Granted for: GEOL681 or GEOL789X.
Formerly: GEOL789X.

GEOL682 Computational Geodynamics (3 Credits)
An introduction to the techniques used to model geodynamics processes. The focus is on understanding and applying techniques, not on proving their worth and programming. Students will learn about Finite Element, Boundary Elements, and Finite Differences methods. We will not explore these topics with the rigor expected by Applied Mathematics but focus instead on practical aspects and their application to geodynamics.
Prerequisite: Permission of CMNS-Geology department; or (MATH462, GEOL680, and MATH240).
Recommended: Familiarity with MATLAB.
Credit Only Granted for: GEOL682 or GEOL789M.
Formerly: GEOL789M.

GEOL688 Geology Colloquium (1 Credit)
Contemporary research topics and issues in geosciences are explored through the weekly Geology departmental colloquium and discussion of its contents.
Restriction: Restricted to graduate students in Geology who have not yet advanced to PhD candidacy. Repeatable for credit with changing content. May not be taken for credit concurrently with GEOL497 or GEOL497H.
Repeatable to: 4 credits.

GEOL690 Geoscience Communications (3 Credits)
Explores the style and logic of scientific writing including abstracts, articles, and proposals, as well as the preparation of clear and concise presentations, in order to enhance the quality of scientific communication and hasten the pace of successful publications.
Credit Only Granted for: GEOL690, GEOL789R, or GEOL789S.
Formerly: GEOL789R and GEOL789S.

GEOL789 Recent Advances in Geology (2-4 Credits)
Recent advances in geology research.

GEOL798 Seminar in Geology (1-3 Credits)
Discussion of special topics in current literature in all phases of geology.
Repeatable to: 9 credits if content differs.

GEOL799 Master's Thesis Research (1-6 Credits)

GEOL898 Pre-Candidacy Research (1-8 Credits)

GEOL899 Doctoral Dissertation Research (1-8 Credits)

GERM - Germanic Studies

GERM401 Advanced Conversation (3 Credits)
Development of fluency in spoken German to achieve advanced level.
Prerequisite: GERM302; or students who have taken courses with comparable content may contact the department.

GERM403 Advanced Composition (3 Credits)
Advanced instruction in and acquisition of German writing skills.
Prerequisite: GERM302; or students who have taken courses with comparable content may contact the department.

GERM415 German/English Translation I (3 Credits)
An intensive presentation of German grammar limited exclusively to reading skill; graded readings in the arts and sciences. Instruction in English; cannot be used to satisfy the arts and humanities foreign language requirement.
Restriction: Must not have completed GERM101, GERM102, GERM103, GERM201, GERM202, GERM203, GERM204, GERM301, or GERM302.

GERM419 Selected Topics in German Language Study (3 Credits)

GERM436 The Usual Suspects: Criminals in German Literature and Film (3 Credits)
An examination of how historical, cultural and political discourses in German-speaking countries influence social norms and criteria for judging what is considered socially acceptable or "deviant". Texts and films span from the 18th to 21st centuries. Taught in German.
Prerequisite: GERM320 or GERM322; or permission of instructor.

GERM439 Selected Topics in German Literature (3 Credits)
Special study of an author, school, genre, or theme. Taught in German.
Prerequisite: GERM320, GERM321, or GERM322; or permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

GERM441 Border Crossings and Cultural Transfers (3 Credits)
Border Crossings and Cultural Transfers emphasizes the transnational and global dimensions of German culture, analyzing the interrelationship of dominant and minority cultures within Germany and/or the impact of German cultures abroad. Topics include migration, exile, (post)colonialism, and globalization. Taught in German.
Prerequisite: GERM320 or GERM322.
Credit Only Granted for: GERM441, GERM439A, or GERM439F.
Formerly: GERM439A, GERM439F.

GERM442 Gender and Sexuality in German Literature and Society (3 Credits)
Gender and Sexuality in German Literature and Society analyzes gender and sexuality as key discourses for understanding German-speaking literatures, cultures, and societies. Topics include the history of sexuality; death and desire; and representations of gender in German literature. Taught in German.
Prerequisite: GERM320 or GERM322.

GERM443 Literature as Cultural Discourse (3 Credits)
Investigates literature as cultural discourse in the construction of knowledge, emphasizing a discursive approach to analyzing a range of literary texts. Taught in German.
Prerequisite: GERM320 or GERM322.
Credit Only Granted for: GERM443, GERM439K, or GERM439G.
Formerly: GERM439K, GERM439G.

GERM444 The German-Jewish Experience (3 Credits)
Focuses on the German-Jewish experience as a key dimension of European history, literature, and culture. Topics include Heinrich Heine, German-Jewish authors and texts, and the Holocaust in literature and film.
Prerequisite: GERM320 or GERM322.
Credit Only Granted for: GERM444 or GERM439Q.
Formerly: GERM439Q.
Additional Information: Taught in German.

GERM449 Selected Topics in Germanic Studies (3 Credits)
Study of a linguistic, literary or cultural topic in Yiddish, Netherlandic, or Scandinavian studies.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

GERM458 Literary or Media Genres (3 Credits)
Literary or Media Genres studies the formal and stylistic dimensions of specific genres, emphasizing genre as a social, political, and aesthetic category. Topics include pop literature; the history of German drama; and German film genres among others.
Prerequisite: GERM320 or GERM322.
Repeatable to: 6 credits if content differs.
Additional Information: Taught in German.

GERM463 The World of the Viking Sagas (3 Credits)
An in-depth analysis of the Old Norse/Viking sagas of Medieval Scandinavia as literature historiography and folklore. Readings include Sagas of the Icelanders, Kings Sagas and Heroic/Mythical Sagas. Taught in English.

GERM473 Variation in Contemporary German Language (3 Credits)
Examines the unique, multilingual society that is modern Germany, exploring issues such as regional varieties, gendered language, language reform (and resistance to it), public and media speech, the influence of American English on colloquial speech and in specific fields, and the problems of immigrant communities acquiring both dialect and standard German.
Prerequisite: GERM302; or permission of instructor. Also offered as: GERM673.
Credit Only Granted for: GERM473, GERM489M, or GERM673.
Formerly: GERM489M.

GERM475 Old Norse (3 Credits)
The language of the old Icelandic saga, the Eddas and Skaldic poetry. Reading of texts in the original; historical development of Old Norse and its role in the Germanic language family. No knowledge of German or a Scandinavian language required. Taught in English.

GERM479 Selected Topics in Germanic Philology (3 Credits)
Selected topics such as comparative Germanic studies, Old Norse language or readings in Old Norse literature, modern German dialectology.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

GERM488 Capstone Seminar (3 Credits)
Provides an opportunity for German majors (usually in their senior year) to demonstrate that they have achieved the goals for learning established and approved by the department. Students analyze in depth a research topic and apply their accumulated learning. Requirements include engaging in an in-depth research project (research paper or media project) and an in-class presentation of their research to faculty and student peers. Taught in German.
Prerequisite: Students must have completed two 400-level courses taught in German.

GERM489 Social Issues in German Culture (1-3 Credits)
Special topics course examining the cultural constructions and representations of important social and political issues, investigating their connection to German values and institutions. Taught in German.
Prerequisite: GERM320 or GERM322.
Repeatable to: 6 credits if content differs.

GERM498 Honors Thesis Writing (3 Credits)
Required for students pursuing departmental honors in Germanic languages and literatures. Under the direction of a German department faculty member, students write their honors theses.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

GERM499 Directed Study (1-3 Credits)

GERM618 College Teaching of German (1 Credit)
Instruction, demonstration and classroom practice under supervision of modern procedures in the presentation of elementary German courses to college age students.
Repeatable to: 3 credits.
Formerly: GERM611.

GERM620 Methods of German Literary Studies I: Theory (3 Credits)
History, methods and concepts of German literary studies. The teaching modules include a general introduction to "Germanistik," an in-depth discussion of literary theory and criticism, and the typology of genres.

GERM673 Variation in Contemporary German (3 Credits)
Examines the unique, multilingual society that is modern Germany, exploring issues such as regional varieties, gendered language, language reform (and resistance to it), public and media speech, the influence of American English on colloquial speech and in specific fields, and the problems of immigrant communities acquiring both dialect and standard German. This may count for the upper-division requirement of the German major.Also offered as: GERM473.
Credit Only Granted for: GERM489L, GERM673, or GERM689L.

GERM689 Special Topics - M.A. Level (1-3 Credits)
M.A.-level study of a literary, linguistic or cultural topic in German or Germanic studies.
Repeatable to: 6 credits if content differs.

GERM798 Master's Independent Study (1-3 Credits)

GERM799 Master's Thesis Research (1-6 Credits)

GERM818 Seminar: The Middle Ages (3 Credits)
Study of one or more representative authors or works of the Middle Ages.
Repeatable to: 9 credits if content differs.

GERM819 Seminar: The 16th and 17th Centuries (3 Credits)
The German literature of the Humanists, the Reformation and the Baroque as illustrated by study of one or more authors of the 16th or 17th centuries.
Repeatable to: 9 credits if content differs.

GERM828 Seminar: The 18th Century (3 Credits)
Study of one or more authors from the Enlightenment, Sentimentalism, Stress, or Classicism periods.
Repeatable to: 9 credits if content differs.

GERM829 Seminar: The 19th Century (3 Credits)
Study of one or more authors of Romanticism, Biedermeier, Young Germany or Realism.
Repeatable to: 9 credits if content differs.

GERM838 Seminar: The 20th Century (3 Credits)
Study of a literary movement or of one or more authors from the period of Naturalism to the present.
Repeatable to: 9 credits if content differs.

GERM839 Seminar: Special Topics (3 Credits)
Study of a topic of a general nature and not limited to any specific century.
Repeatable to: 9 credits if content differs.

GERM879 Seminar in Germanic Philology (3 Credits)
In depth study of a topic in Germanic or Indo-European philology comparative Germanic grammar, runology, dialect geography, Eddic or Skaldic poetry, Indo-European studies.
Repeatable to: 9 credits if content differs.

GERM888 Doctoral Independent Study (1-3 Credits)

GERM889 Seminar in Germanic Area Studies (3 Credits)
Comprehensive study of a selected topic in German or Germanic area studies: history of ideas, cultural history, Germanic literatures other than German, folk literature and folklore.
Repeatable to: 9 credits if content differs.

GERM898 Pre-Candidacy Research (1-8 Credits)

GERM899 Doctoral Dissertation Research (1-8 Credits)

GREK - Greek

GREK403 Greek Tragedy (3 Credits)

GREK411 Modern Greek Literature and History (3 Credits)
Students will study historical and political events in Greece during the 19th and 20th centuries through the viewpoint of the man of letters. Poetry, prose, plays, and essays reflect national emancipation, social reconstruction, and political struggles. Readings and discussion are in Modern Greek.
Prerequisite: Students must have earned a grade of C- or better in a 300-level Modern Greek course.
Restriction: Permission of instructor.
Credit Only Granted for: GREK311 or GREK411.
Formerly: GREK311.

GREK415 Homer (3 Credits)
Extensive readings in Greek from the Iliad or the Odyssey, with special attention to the features of Homeric style and the relationship between the two epics.
Prerequisite: Permission of ARHU-Classics department.

GREK472 History and Development of the Greek Language (3 Credits)
Mastery of ancient Greek through grammar review, prose composition, and analysis of historical developments in Greek writers' modes of expression.
Restriction: Permission of instructor.

GREK488 Greek Readings (3 Credits)
The reading of one or more selected Greek authors. Reports.
Prerequisite: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.
Additional Information: Readings are in ancient Greek.

GREK499 Independent Study in Greek Language and Literature (1-3 Credits)

GREK603 Greek Tragedy (3 Credits)
The reading of two tragedies of the Athenian tragedians. Detailed discussion of historical background, literary art, thought, and the circumstances and manner of their production. Other tragedies will be read in English.

GREK604 Homer (3 Credits)
The extensive and intensive reading of Homer, with concentration on one of his two epics. Discussion of the language, artistic qualities, and thought of the poems, and of modern views concerning their orgin and literary qualities.

GREK606 Greek Historians (3 Credits)
Survey of the Greek historians, concentrating on Herodotus and Thucydides, contrasting the two historians in the areas of subject, methods of research, composition, and achievement.

GREK672 History and Development of the Greek Language (3 Credits)
Mastery of ancient Greek through grammar review, prose composition, and analysis of historical developments in Greek writers' modes of expression.
Restriction: Permission of instructor.

GREK688 Special Topics in Greek Literature (3 Credits)

GREK699 Independent Study in Greek Literature (1-3 Credits)

GREK799 Master's Thesis Research (1-6 Credits)

GVPT - Government and Politics

GVPT402 International Law (3 Credits)
A study of the basic character, general principles and specific rules of international law, with emphasis on recent and contemporary trends in the field and its relation to other aspects of international affairs.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; and junior standing or higher.

GVPT406 International Organizations (3 Credits)
A basic introduction to the full range of international organizations that have come into being over the past century and one-half, including those that aspire to be universal or global, those with a geopolitical or regional focus, and those that address specific structural or functional areas of human endeavor or issue areas.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; and junior standing or higher. Or must be in Government & Politics: International Relations program; and junior standing or higher.

GVPT407 International Political Economy (3 Credits)
Introduces the field of international political economy, which analyzes the ways in which economic and political changes produce both economic and political reactions.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; and junior standing or higher.

GVPT409 Seminar in International Relations and World Politics (3 Credits)
Reading, writing, and research on topics in international relations and world politics. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT200.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations) ; and junior standing or higher.
Repeatable to: 9 credits if content differs.

GVPT417 Seminar in Advanced Topics in Environmental Policy Analysis (3 Credits)
A series of critical tools and methods used to analyze environmental policy. This class should be of interest to students who are either considering a career or graduate studies in environmental protection.
Prerequisite: GVPT273.
Restriction: Must be in one of the following programs (Government & Politics; Environmental Sci&Policy-Env Politics & Policy).
Credit Only Granted for: GVPT419B or GVPT417.
Formerly: GVPT419B.

GVPT419 Seminar in Public Policy (3 Credits)
Reading, writing, and research on topics in public policy. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT270.
Restriction: Must be in Government & Politics program.
Repeatable to: 6 credits if content differs.

GVPT420 The Logic and Practice of Measuring Political Behavior (3 Credits)
Introduction to concepts and practices used for measuring political behavior. Political analysis is an increasingly quantitative field, It is crucial for students of political behavior to learn how to define concepts in concrete ways, examine different methods of measuring concepts, learn how to test the quality of chosen measures, learn how to construct richer measures out of multiple questions, and finally how to examine the relationship between multiple measures of similar concepts. Common pitfalls, errors, bias, and ethics will be examined along the way.
Prerequisite: GVPT201.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.

GVPT421 Advanced Quantitative Methods (3 Credits)
Advanced quantitative methods for political science research.
Prerequisite: GVPT201.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations).

GVPT422 Quantitative Political Analysis (3 Credits)
Introduction to quantitative methods of data analysis, including selected statistical methods, block analysis, content analysis, and scale construction.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT220.
Restriction: Must be in Government & Politics program.
Credit Only Granted for: BIOM301, BMGT230, CCJS200, ECON230, ECON321, EDMS451, GEOG306, GEOL351, GVPT422, INST314, JOUR405, PSYC200 or SOCY201. (These courses do not necessarily meet the same major requirements-check with your advisor to see which of these courses will count for your major).

GVPT423 Elections and Electoral Behavior (3 Credits)
An examination of various topics relating to elections; the focus includes the legal structure under which elections are conducted, the selection and nomination process, the conduct of election campaigns, and patterns of political participation and voting choice in different types of elections.
Prerequisite: GVPT241 and GVPT170.
Restriction: Must be in Government & Politics program.

GVPT424 Quantitative Study of International Relations (3 Credits)
A comprehensive introduction to the quantitative study of international conflict. Students will perform statistical analysis of international conflict data using the R software platform.
Prerequisite: GVPT201.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations).
Credit Only Granted for: GVPT409H (Fall 2015 and Fall 2016) or GVPT424.
Formerly: GVPT409H (Fall 2015 and Fall 2016).

GVPT428 Topics in Formal Theories of Political Behavior and Politics (3 Credits)
An evaluation of theories of political behavior such as game, social choice and voting theory, and their applications to problems of distribution and social justice, community organizing, responsive public policy, institutional design, and alliance and coalition formation.
Prerequisite: GVPT241 and GVPT221.
Restriction: Must be in Government & Politics program.
Repeatable to: 6 credits if content differs.

GVPT429 Problems in Political Behavior (3 Credits)
The problem approach to political behavior with emphasis on theoretical and empirical studies on selected aspects of the political process.
Prerequisite: GVPT241.
Recommended: GVPT220.
Restriction: Must be in Government & Politics program.

GVPT431 Introduction to Constitutional Law (3 Credits)
A systematic inquiry into the general principles of the American constitutional system, with special reference to the role of the judiciary in the interpretation and enforcement of the federal constitution.
Prerequisite: GVPT170 and GVPT331.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations) ; and junior standing or higher.

GVPT432 Civil Rights and the Constitution (3 Credits)
A study of civil rights in the American constitutional context, emphasizing freedom of religion, freedom of expression, minority discrimination, and the rights of defendants.
Prerequisite: GVPT170 and GVPT331.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations).

GVPT433 The Judicial Process (3 Credits)
An examination of judicial organization in the United States at all levels of government, with some emphasis on legal reasoning, legal research, and court procedures.
Prerequisite: GVPT241 and GVPT331.
Restriction: Must be in Government & Politics program.

GVPT439 Seminar in Public Law (3 Credits)
Reading, writing, and research on topics in public law. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT331.
Restriction: Must be in Government & Politics program; and junior standing or higher.
Repeatable to: 6 credits if content differs.

GVPT441 History of Political Theory: Ancient and Medieval (3 Credits)
A survey of the principal political theories set forth in the works of writers before Machiavelli.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program; and junior standing or higher.

GVPT442 History of Political Theory--Medieval to Recent (3 Credits)
A survey of the principal theories set forth in the works of writers from Machiavelli to Nietzsche.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program.

GVPT443 Contemporary Political Theory (3 Credits)
A survey of the principal political theories and ideologies set forth in the works of writers from Karl Marx to the present.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program.

GVPT445 Marxism and Postmarxism (3 Credits)
The study of Marxist thought and an assessment of the critical transformations and reassessments of the theory and practice of Marxism.
Restriction: Must be in a major within BSOS-Government & Politics department.

GVPT448 Non-Western Political Thought (3 Credits)
Examination of works by major authors and general themes of political thought originating in Asia, the Middle East, and Africa. This is not a survey of all non-Western political thought, but a course to be limited by the professor with each offering.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program.
Additional Information: Permission of department required for repeat.

GVPT449 Seminar in Political Philosophy (3 Credits)
Reading, writing, and research on topics in political philosophy. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program.
Repeatable to: 6 credits if content differs.

GVPT454 Seminar in the International Relations of China (3 Credits)
Explores the foreign relations behavior of the People's Republic of China, with focus on the contemporary era.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; and junior standing or higher. Or must be in Government & Politics: International Relations program; and junior standing or higher.

GVPT456 The Politics of Terrorism (3 Credits)
Examination of the definition, causes and organization of terrorist activity, along with key domestic and international counter- and anti-terrorism responses. Special emphasis on challanges and opportunities to the scientific study of terrorism.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.
Credit Only Granted for: GVPT456 or GVPT459T.
Formerly: GVPT459T.

GVPT457 American Foreign Relations (3 Credits)
The principles and machinery of the conduct of American foreign relations and an analysis of the major foreign policies of the United States.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; and junior standing or higher.

GVPT458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

GVPT459 Seminar in Comparative Politics (3 Credits)
Reading, writing, and research on topics in comparative politics. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT200; and (GVPT282 or GVPT280).
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.
Repeatable to: 6 credits if content differs.

GVPT460 State Politics and Government (3 Credits)
A study of the structure, procedures and policies of state governments with special emphasis on intergovernmental relationships, and with illustrations from Maryland governmental arrangements.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT260.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.

GVPT461 Local Politics and Government (3 Credits)
An introduction to local government and politics in the U.S. context. The course explores the evolution of local jurisdictions, particularly cities, and the politics of local level decision making.
Prerequisite: GVPT170.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.
Credit Only Granted for: GVPT461 or GVPT479L.
Formerly: GVPT479L.

GVPT462 Urban Politics (3 Credits)
Urban political process and institutions considered in the light of changing social and economic conditions.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT260.

GVPT473 The U.S. Congress (3 Credits)
A detailed survey of lawmaking and the legislative process, emphasizing the U.S. Congress, and its members.
Prerequisite: GVPT241 and GVPT170.
Restriction: Junior standing or higher. And must be in Government & Politics program; or must be in Government & Politics: International Relations program.

GVPT474 Political Parties (3 Credits)
A descriptive and analytical examination of American political parties, nominations, elections, and political leadership.
Prerequisite: GVPT241 and GVPT170.
Restriction: Must be in Government & Politics program.

GVPT475 The Presidency and the Executive Branch (3 Credits)
An examination of the U.S. presidency in historical and contemporary perspective: nomination and electoral politics and the president's place in policy-making, administration, and public opinion.
Prerequisite: GVPT241 and GVPT170.
Restriction: Must be in Government & Politics program; and junior standing or higher.

GVPT476 The Business Government Relationship (3 Credits)
Examines the structures, process, and outcomes of business and government and the politics and products of their cooperative-adversarial relationships in the United States. The design integrates interest group and administrative politics and the public policy process.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT270.
Restriction: Must be in Government & Politics program.

GVPT477 Voting and Participation (3 Credits)
A study of the factors that influence individual vote choice and voter participation in the U.S. The course will introduce political science research pertaining to both topics and will engage current controversies over such things as political campaign laws and the various state and federal rules that govern election administration.
Prerequisite: GVPT170 and GVPT241.
Restriction: Must be in Government & Politics program.

GVPT479 Seminar in American Politics (3 Credits)
Reading, writing, and research on topics in American politics. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT241 and GVPT170.
Restriction: Must be in Government & Politics program; and junior standing or higher.
Repeatable to: 6 credits if content differs.

GVPT481 Government and Administration of Russia and the States of the Former Soviet Union (3 Credits)
A comparative study of the governmental systems and political processes of the states of the former Soviet Union.
Prerequisite: GVPT200; and (GVPT282 or GVPT280).
Restriction: Must be in Government & Politics program.

GVPT482 Government and Politics of Latin America (3 Credits)
A comparative study of the governmental systems and political processes of the Latin American countries.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.

GVPT484 Government and Politics of Africa (3 Credits)
A comparative study of the governmental systems and political processes of the African countries, with special emphasis on the problems of nation-building in emergent countries.
Prerequisite: GVPT282 or GVPT280.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations).

GVPT485 Government and Politics of the Middle East (3 Credits)
A comparative study of the governmental systems and political processes of the African countries, with special emphasis on the problems of nation-building in emergent countries.
Prerequisite: GVPT200; and (GVPT282 or GVPT280).
Restriction: Must be in Government & Politics program.

GVPT487 Government and Politics of China (3 Credits)
Discussion of major issues in the study of the domestic politics of the People's Republic of China.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations) ; and junior standing or higher.
Credit Only Granted for: GVPT359A or GVPT487.
Formerly: GVPT359A.

GVPT622 Quantitative Methods For Political Science (3 Credits)
Introduction to quantitiative methods of data analysis, with emphasis on statistical methods and computer usage. Measures of association, probability, correlation, linear regression estimation techniques, introductory analysis of variance, and use of package computer programs.

GVPT629 Seminar in Research Design (1 Credit)
This is designed to extend and deepen graduate students understanding of research design in empirical political science. Focus is placed on major issues in planning a research project: developing strong theories, formulating clear hypotheses, and crafting strategies to test theories and rule out rival, alternative explanations. Also, issues of effective communication of research will be considered. To get beyond abstractions, examples of research in American politics will be considered and evaluated. Technical issues of statistical analysis or broader epistemological questions in social science will not be covered.

GVPT700 Scope and Method of Political Science (3 Credits)
Required of all Ph.D. candidates. A seminar in the methodologies of political science, and their respective applications to different research fields. Interdisciplinary approaches and bibliographical techniques are also reviewed.

GVPT702 Geographic Information Systems for Social Science Research (3 Credits)
Introduction to the use of Geographic Information Systems for conducting research in the social sciences. Overview of spatially embedded nature of many social science phenomena and content of theories common to spatial thinking. Students will obtain hands-on experience with various GIS tools and methods most frequently employed by social scientists.
Credit Only Granted for: GVPT368I, GVPT702, or GVPT729D.
Formerly: GVPT729D.

GVPT708 Seminar in International Relations Theory (3 Credits)
An examination of the major approaches, concepts, and theories in the study of world politics with special emphasis on contemporary literature.
Repeatable to: 6 credits if content differs.

GVPT718 Selected Topics in Political Science (3 Credits)
Selected topics in the field of political science.
Repeatable to: 9 credits if content differs.

GVPT722 Advanced Quantitative Methods For Political Science (3 Credits)
Introduction to multivariate analysis. Elementary matrix algebra, multiple linear and curvilinear correlation and regression, analysis of variance, canonical correlation and regression, discriminant analysis, and several types of factor analysis.
Prerequisite: GVPT622; or permission of instructor.

GVPT729 Special Topics in Quantitative Political Analysis (3 Credits)
An intensive examination of special topics in quantitative methods of political analysis in such areas as survey research methods, exploratory data analysis, advanced data management techniques, or advanced methods of policy analysis.
Prerequisite: GVPT622; or permission of instructor.
Repeatable to: 6 credits if content differs.

GVPT741 Ancient and Medieval Political Philosophy (3 Credits)
Major writings from the tradition of ancient and medieval political philosophy are studied. The goal is to identify and critically analyze the perennial or persistent questions about political life posed by philosophers in divers times and places.

GVPT742 Modern Political Theory (3 Credits)
The influence of the Enlightenment on political thought, beginning with Machiavelli and ending around the time of Mill and Marx, in which the Enlightenment worked itself out in the hopes and fears of these and other authors.
Recommended: GVPT741.
Restriction: Permission of BSOS-Government & Politics department.

GVPT743 Contemporary Political Theory (3 Credits)
Theorists from Nietzsche (1884-1900) to the present will be covered with a focus on the apparent failure of the Enlightenment to usher in an age of peace and reason.
Restriction: Must have graduate standing.

GVPT761 International Political Economy (3 Credits)
Major issues in international political economy including such matters as the monetary system, trade, debt, and development.
Recommended: GVPT708.

GVPT770 Seminar in American Political Institutions (3 Credits)
This is the core institutions seminar in American politics. The course surveys the primary literature in the field and addresses substantively significant topics related to the study of political institutions in the American context.

GVPT771 Seminar in American Political Behavior (3 Credits)
This is the core seminar in American political behavior. The course will deal with prominent theoretical and empirical issues in the areas of voting, public opinion, political participation and other aspects of political behavior in the American context.

GVPT780 Seminar in the Comparative Study of Politics (3 Credits)
An examination of the salient approaches to and conceptual frameworks for the comparative study of politics, followed by the construction of models and typologies of political systems.

GVPT799 Master's Thesis Research (1-6 Credits)

GVPT803 Seminar in International Political Organization (3 Credits)
A study of the forms and functions of various international organizations.

GVPT808 Selected Topics in Functional Problems in International Relations (3 Credits)
An examination of the major substantive issues in contemporary international relations.

GVPT828 Selected Problems in Political Behavior (3 Credits)
Individual reading and research reports on selected problems in the study of political behavior.

GVPT831 Formal Theories of Politics I (3 Credits)
Survey of major formal theories of politics, with emphasis on those theories based on the assumptions of rationality. The theory of public goods, game theory, coalition theory, and the theoretical properties of voting systems.

GVPT838 Topics in Formal Political Theory (3 Credits)
An examination of selected topics in formal theory.
Prerequisite: GVPT831; or permission of instructor.

GVPT848 Current Problems in Political Theory (3 Credits)
Intensive examination of the development of political theory since the Second World War.
Prerequisite: GVPT443.

GVPT849 Readings in Government and Politics (3 Credits)
Guided readings and discussions on selected topics in political science.

GVPT859 Selected Topics in Public Policy (3 Credits)
An examination of selected topics in public policy, such as judicial education, health, welfare, and resources policy.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

GVPT868 Problems of State and Local Government (3 Credits)
Report of topics assigned for individual study in the field of state local government throughout the United States.

GVPT869 Seminar in Urban Administration (3 Credits)
Selected topics are examined by the team research method with students responsible for planning, field investigation, and report writing.

GVPT870 Interest Groups Politics in the United States (3 Credits)
The theory and practice of interest group politics in the United States.
Recommended: GVPT770.

GVPT873 Seminar in Legislatures and Legislation (3 Credits)
Reports on topics assigned for individual study and reading about the composition and organization of legislatures and about the legislative process.

GVPT874 Seminar in Political Parties and Politics (3 Credits)
Reports on topics assigned for individual study and reading in the fields of political organization and action.

GVPT877 The Politics of the Presidency (3 Credits)
The major research topics and issues pertaining to the United States presidency.
Recommended: GVPT770.

GVPT878 Problems in American Government and Politics (3 Credits)
An examination of contemporary problems in various fields of government and politics in the United States, with reports on topics assigned for individual study.

GVPT879 Topics on International Security (3 Credits)
A detailed and advanced analysis of particular regional problems on defense policy and arms control.
Recommended: GVPT876.
Repeatable to: 6 credits if content differs.

GVPT884 Field Methods in Comparative Politics (3 Credits)
A practical designed for graduate students interested in field research. Research design, case selection, developing surveys and experiments, analysis of original data, and some qualitative methods will be emphasized, with the aim that students develop the practical skills to conduct their own field research.

GVPT888 Selected Topics in Comparative Governmental Institutions (3 Credits)
An examination of special topics in comparative politics.

GVPT889 Selected Topics in Area Problems in International Relations (3 Credits)
Special topics concerning regional problems in the relations of states.

GVPT898 Pre-Candidacy Research (1-8 Credits)
Guided readings and discussions on selected topics in political science.

GVPT899 Doctoral Dissertation Research (1-8 Credits)

HACS - ACES-Cybersecurity

HACS402 Applied Security Analysis and Visualization (3 Credits)
Focuses on exploratory and statistical data analysis, data and information visualization, and the presentation and communication of analysis results. These topics will be presented and explored in the context of and with applications to cybersecurity related data.
Restriction: Must be a student in the ACES (Advanced Cybersecurity Experience for Students) Minor Program.

HACS408 Advanced Seminar in Cybersecurity (3 Credits)
Explores various lenses of cybersecurity in order to promote an interdisciplinary understanding of the field. Although each section may focus on a different topic, each integrates active student engagement, communication, critical communication, critical thinking, and teamwork.
Restriction: Must be a student in the ACES (Advanced Cybersecurity Experience for Students) Minor Program.
Repeatable to: 9 credits if content differs.

HACS479 Undergraduate Research in Cybersecurity (1-3 Credits)
The Advanced Cybersecurity Experience for Students (ACES) program encourages its students to engage in research in order to gain greater insight into a specific area within cybersecurity, obtain an appreciation for the subtleties and difficulties associated with the production of knowledge and fundamental new applications, and to prepare for graduate school and the workforce.
Restriction: Must be a student in the ACES (Advanced Cybersecurity Experience for Students) Minor Program; and permission of UGST-HCOL-ACES Cybersecurity Program.
Repeatable to: 6 credits if content differs.

HACS498 Cybersecurity Group Problem Solving (3 Credits)
The Advanced Cybersecurity Experience for Students (ACES) program encourages its students to engage in team problem solving activities in order to gain greater insight into a specific area within cybersecurity and to obtain an appreciation for the subtleties and difficulties associated with these activities in order to prepare students for graduate school and the workforce. Students engage in a semester long problem solving or development project under the mentorship of a industry specialist and with the guidance of university faculty. Through the exercise the students will develop teamwork experience and professional communication skills in addition to experience of the project itself. The project might be evaluation, creation, testing or analysis of some area of cybersecurity as needed by the mentor-sponsor. A contract of what will be accomplished is required must be agreed upon by the mentor, the student and the ACES leadership before the project can begin.
Restriction: Must be a student in the ACES (Advanced Cybersecurity Experience for Students) Minor Program; and permission of UGST-HCOL-ACES Cybersecurity Program.
Repeatable to: 6 credits.

HEBR - Hebrew

HEBR430 Critical Issues in Israeli Cinema (3 Credits)
Critical investigation of Zionist and Israeli culture and politics through film.Also offered as: FILM430.
Credit Only Granted for: HEBR430 or FILM430.

HEBR498 Special Topics in Hebrew (3 Credits)

HEBR499 Independent Study in Hebrew (1-3 Credits)
Independent study under faculty supervision.
Prerequisite: Permission of instructor.
Repeatable to: 6 credits if content differs.

HESI - Higher Ed, Student Affairs, and International Ed Policy

HESI417 Advanced Leadership Seminar (3 Credits)
Students will analyze and synthesize the concept of leadership using cultural, ethical, sociological, historical perspectives. Exploration and reflection of personal values, decision making, in-depth analysis on various leadership activities. Theories will be emphasized.
Prerequisite: HESI217; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP417 or HESI417.

HESI418 Special Topics in Leadership (3 Credits)
The special topics and leadership course will address a single topic related to leadership through the semester. In-depth study and analysis on the topic will be the basis for the course. Topics include gender and leadership, ethics and leadership, and culture and leadership. Leadership will serve as the foundation in the course.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: HESI418 or EDCP418.
Formerly: EDCP418.

HESI470 Introduction to Student Personnel (3 Credits)
A systematic analysis of research and theoretical literature on a variety of major problems in the organization and administration of student personnel services in higher education. Included will be discussion of such topics as the student personnel philosophy in education, counseling services, discipline, housing, student activities, financial aid, health, remedial services, etc.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP470 or HESI470.
Formerly: EDCP470.

HESI489 Field Experiences in Higher Education, Student Affairs, and International Education Poli (1-4 Credits)
Planned field experience in education and community related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

HESI498 Special Problems in Higher Education, Student Affairs, and International Education Policy (1-3 Credits)
Available only to HESI students who have formal plans for individual study of approved problems.
Prerequisite: Available only to HISA, HIED, and HIEP students who have formal plans for individual study of approved problems.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

HESI499 Workshops, Clinics, Institutes (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: workshops conducted by the Higher Education, Student Affairs, and International Education Policy program (or developed cooperatively with other departments, colleges and universities) and not otherwise covered in the present course listings.
Repeatable to: 6 credits.

HESI655 Organizational Dimensions of Student Affairs (3 Credits)
Exploration of leadership and organizational change of student affairs programs in post-secondary education.
Prerequisite: EDCP610; or permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP655 or HESI655.
Formerly: EDCP655.

HESI671 Intergroup Dialogue Facilitation Practicum (3 Credits)
Developing knowledge and skills for facilitating intergroup dialogues. Using the principles and content of intergroup dialogues to create scenarios for the practice of listening, understanding, and taking action under theories of social justice.
Prerequisite: EDCP616 and HESI771; or permission of instructor.
Restriction: Limited to HESI Student Affairs Concentration students only.
Credit Only Granted for: EDCP671 or HESI671.
Formerly: EDCP671.

HESI672 Individual and Organizational Assessment in Student Affairs (3 Credits)
An examination of the scholarship and practice of assessment of college student learning and developmental outcomes as well as organizational practices that contribute to those outcomes.
Credit Only Granted for: EDCP672 or HESI672.
Formerly: EDCP672.

HESI739 Higher Education, Student Affairs, & International Education Policy Study Abroad (1-6 Credits)
An exploration of topics related to higher education, student affairs, & international education policy abroad. Participants engage in tenets associated with University of Maryland Education Abroad programs.
Repeatable to: 9 credits.

HESI771 The College Student (3 Credits)
A demographic study of the characteristics of college students as well as a study of their aspirations, values, and purposes.
Credit Only Granted for: EDCP771 or HESI771.
Formerly: EDCP771.

HESI773 Designing Qualitative Research in Counseling and Student Affairs Contexts (3 Credits)
Introduction to philosophical and epistemological foundations, methodologies and methods associated with qualitative research designs appropriate in student affairs and counseling contexts.
Credit Only Granted for: EDCP773 or HESI773.
Formerly: EDCP773.

HESP - Hearing and Speech Sciences

HESP400 Speech and Language Development in Children (3 Credits)
Analysis of the normal processes of speech and language development in children.
Prerequisite: Minimum grade of C- in HESP300; or permission of BSOS-Hearing & Speech Sciences department.
Recommended: LING200 or HESP120.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP402 Language and Phonological Disorders in Children (3 Credits)
Etiology, assessment and treatment of language and phonological disorders in children.
Prerequisite: Minimum grade of C- in HESP400; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program.

HESP403 Introduction to Phonetic Science (3 Credits)
An introduction to physiological, acoustic and perceptual phonetics; broad and narrow phonetic transcription; current models of speech production and perception.
Prerequisite: Minimum grade of C- in HESP305; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP404 Fluency & Voice Disorders (3 Credits)
Etiology, assessment and therapeutic management of phonation, resonance, and fluency disorders in children and adults.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP406 Acquired Neurogenic Communication Disorders in Adults (3 Credits)
Survey of the dysarthrias and aphasias in adults from an interdisciplinary point of view.
Prerequisite: Minimum grade of C- in HESP300 and HESP305; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP407 Bases of Hearing Science (3 Credits)
Fundamentals of hearing, including the physics of sound, anatomy and physiology of peripheral and central auditory nervous system, psychophysical procedures used in measurement of auditory sensation and perception, and topics in psychological acoustics.
Prerequisite: Minimum grade of C- in HESP311; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP411 Introduction to Audiology (3 Credits)
An introduction to the field of audiology. Evaluation and remediation of hearing handicaps.
Prerequisite: Minimum grade of C- in HESP311; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP413 Aural Rehabilitation/Habilitation (3 Credits)
The fundamental aspects of aural rehabilitation therapy for both adults and children are introduced to students. Class time will consist of lectures, discussions, and hands-on activities.
Prerequisite: HESP411.
Restriction: Sophomore standing or higher.

HESP417 Principles and Methods in Speech-Language Pathology and Audiology (3 Credits)
The principles underlying the treatment of speech, language and hearing disorders in children and adults.
Prerequisite: HESP400 and HESP411; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP418 Clinical Practice in Speech-Language Pathology and Audiology (3 Credits)
Supervised observation with some direct participation in clinical methods for the treatment of disorders of articulation, fluency, child and adult language; evaluation and habilitation/rehabilitation of hearing impaired children and adults.
Prerequisite: Minimum grade of C- in HESP417.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits.

HESP422 Neurological Bases of Human Communication (3 Credits)
Basic neurology as it pertains to anatomy and physiology substrates of speech and language.
Prerequisite: HESP305; or permission of instructor.
Credit Only Granted for: HESP498 or HESP422.

HESP469 Honor Thesis Research (1-3 Credits)
Student will develop thesis proposal, conduct research, analyze results, develop and defend final written document.
Prerequisite: Permission of honors thesis advisor required.
Repeatable to: 6 credits if content differs.

HESP498 Seminar (3 Credits)
Selected topics in human communication and its disorders.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP499 Independent Study (1-3 Credits)
A directed study of selected topics pertaining to human communication and its disorders.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP600 Instrumentation in Hearing and Speech Sciences (3 Credits)
Types and principles of operation of electronic equipment used in the hearing and speech sciences.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP601 Foundations of Scientific Inquiry (1 Credit)
Overview of methods of empirical research used in Communication Sciences and Disorders. The course will focus on identifying, critically analyzing, and writing about empirical research.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of Instructor.
Additional Information: Course meets over three semesters for the duration of the Masters of Speech-Language Pathology program.

HESP602 Advanced Seminar in Neurological Bases of Communication (2 Credits)
An advanced discussion of the neural bases of human communication and its disorders, neuroimaging, neural plasticity and neurological evaluations, with emphasis on current developments and critical analysis.
Prerequisite: An undergraduate course in human neuroanatomy.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.

HESP603 Seminar in Cultural and Linguistic Diversity in Communication Disorders (1 Credit)
Overview of cultural and linguistic diversity (CLD) in general, and the impact of CLD on communication, communication disorders, and the professional practice of Speech-Language Pathology
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of Instructor.
Additional Information: Course meets over four semesters for the duration of the Masters of Speech-Language Pathology program.

HESP605 Assessment & Intervention in Bilingual Populations (3 Credits)
Integrates foundational knowledge pertaining to bilingualism in speech-language pathology. This course provides students with a framework for working with individuals from culturally and linguistically diverse backgrounds. This course is designed to educate and train student clinicians to serve as bilingual speech-language pathologists.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program.

HESP606 Basic Hearing Measurements (3 Credits)
Theoretical principles, methodology, and interpretation of routine audiometric tests, including pure tone, speech, and acoustic immittance measures. Modification of procedures for special populations. Equipment calibration and mass hearing screening programs.
Prerequisite: HESP411; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP610 Language Disorders in Adults (2 Credits)
Etiology, diagnosis and management of language problems of adults associated with aging, brain injury and degenerative conditions.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of instructor.

HESP611 Cognitive Disorders in Adults (2 Credits)
Etiology, diagnosis and management of cognitive problems of adults associated with aging, brain injury and degenerative conditions.
Prerequisite: Must have completed or be concurrently enrolled in HESP610; and must have knowledge of basic human neuroanatomy.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of instructor.

HESP612 Fluency Disorders (2 Credits)
The nature of fluency disorders. Principles, methods and procedures for the clinical management of fluency disorders in children and adults.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP613 Autism Spectrum Disorders (2 Credits)
Etiology, diagnosis and management of autism spectrum disorders.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of instructor.
Credit Only Granted for: HESP639A or HESP613.
Formerly: HESP639A.

HESP614 Orofacial Anomalies (3 Credits)
Communication disorders related to congenital orofacial anomalies with an emphasis on cleft lip and palate. Principles, methods and procedures for clinical management.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP615 Counseling in Communicative Disorders (3 Credits)
Introduction to the application of counseling principles and methodologies for working with individuals with communication disorders and their families. The role of the audiologist and speech language pathologist as counselors will be explored. Class content will focus on theoretical approaches and techniques to counseling from the fields of psychology, social work, and family the family therapy. The application of counseling in the diagnostic process as well as treatment of a wide variety of communication disorders will be highlighted throughout the course.
Recommended: HESP400 and HESP411.

HESP616 Language Disorders in the Pre-school Age (2 Credits)
Theoretical, empirical and clinical perspectives on language disorders in children from infancy through pre-school age.
Prerequisite: HESP400; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP617 Cultural and Linguistic Diversity in Communication and its Disorders (2 Credits)
An exploration and discussion of cultural and linguistic diversity, its impact on communication and communication disorders, and strategies for assessment and intervention of culturally and linguistically diverse clients
Recommended: HESP417 or equivalent.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)).

HESP620 Speech Production Disorders Across the Lifespan (3 Credits)
Assessment and treatment of phonological, articulatory and resonance disorders arising from various etiologies including developmental conditions, structural abnormalities, and nervous system damage.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of instructor.

HESP622 Neuromotor Disorders of Speech (3 Credits)
Effects of neuropathology on speech production. Classification and assessment of the resultant disorders and their treatment.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP624 Voice Disorders (2 Credits)
Etiological characteristics, assessment and treatment of phonatory disorders in children and adults.
Restriction: Permission of BSOS-Hearing & Speech Sciences department; or must be in Hearing and Speech Sciences: M.A. (Master's) program.

HESP625 Dysphagia (2 Credits)
Nature and clinical management of dysphagia as it pertains to different clinical settings for adult and pediatric populations.
Restriction: Permission of BSOS-Hearing & Speech Sciences department; or must be in Hearing and Speech Sciences: M.A. (Master's) program.

HESP626 Language disorders in school-aged children and adolescents (2 Credits)
Etiology, assessment and treatment of communication and learning problems in school age children and adolescents

HESP627 Augmentative and Alternative Communication (2 Credits)
Principles, methods, and procedures for categorizing, understanding, and developing augmentative and alternative communication.
Recommended: Prior knowledge of Communication and its Disorders is required.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Credit Only Granted for: HESP639R or HESP627.

HESP630 Electrophysiological Measurements (3 Credits)
Principles and techniques of physiological and electrophysiological measures of the audio-vestibular mechanisms.
Prerequisite: HESP606.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP632 Medical Audiology (3 Credits)
Overview of auditory pathologies, and their assessment and management in the medical setting.
Prerequisite: HESP311.
Corequisite: HESP606.

HESP634 Anatomy and Physiology of the Auditory and Vestibular Systems (3 Credits)
Comprehensive examination of the anatomy and physiology of the peripheral as well as the central auditory and vestibular systems. Both afferent and efferent pathways will be considered. Applications of basic auditory neuroscience to contemporary clinical audiology practice will be highlighted.
Prerequisite: Must have completed or be concurrently enrolled in HESP311, HESP407, and HESP411; or permission of instructor.
Additional Information: Fills a requirement for the Doctoral Program in Clinical Audiology (CAUD). Open to students in other graduate programs, especially NACS.

HESP635 Aural Rehabilitation/Habilitation (3 Credits)
Principles, methods and procedures for aural rehabilitation/habilitation in children and adults.

HESP636 Geriatric Audiology (3 Credits)
Research findings are presented on the physical effects of aging on the auditory periphery and central nervous system, as well as the consequences of aging on behavioral and electrophysiologic measures of auditory function. Clinical implications in the effects of physiologic and cognitive aging on auditory performance will be discussed.
Prerequisite: HESP606 and HESP700.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)).

HESP638 Research Practicum (1-3 Credits)
Analysis, synthesis and integration of knowledge related to current research or clinical issues in human communication and its related disorders.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP639 Special Topics in Hearing and Speech Sciences (1-3 Credits)
Intensive coverage of selected topics of current interest.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP645 Pediatric Audiology (3 Credits)
Evaluation and treatement of hearing-impaired children.
Prerequisite: HESP606.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP646 Educational Audiology (3 Credits)
Examination of historical and current trends influencing educational programming for hearing-impaired children, communication options for severely and profound hearing-impaired children, and the role of the audiologist in the educational setting.
Prerequisite: HESP606.
Recommended: HESP645.

HESP648 Clinical Practice in Speech (1-3 Credits)
Supervised training in the application of clinical methods in the diagnosis and treatment of speech disorders.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP649 Clinical Practice in Audiology (1-3 Credits)
Supervised training in the application of clinical methods in the diagnosis and treatment of hearing disorders.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP658 Special Clinical Topics in Hearing and Speech (1-3 Credits)
Comprehensive coverage of selected topics pertinent to clinical issues. Specific content varies each semester, and may include supervision, clinical ethics, etc.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP700 Hearing Aids (3 Credits)
Principles, methods and procedures for selection, fitting, calibration and management of amplification systems for hearing-impaired children and adults.

HESP701 Hearing Aids II (3 Credits)
Advanced issues in amplification technology, prescriptive hearing aid selection, and management of amplification systems for special populations.
Prerequisite: HESP700.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP702 Diagnostic Procedures in Speech-Language Pathology (2 Credits)
Diagnostic tools and methods in the analysis of speech-language disorders in children and adults.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP706 Advanced Clinical Audiology (3 Credits)
Advanced clinical and experimental methods of evaluating the peripheral and central auditory system using acoustic stimuli. Procedural considerations and interpretation of test results.
Prerequisite: HESP606; or students who have taken courses with comparable content may contact the department.

HESP708 Independent Study (1-6 Credits)
Individual research projects under guidance of a faculty member.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP710 Industrial and Environmental Noise Problems (3 Credits)
Evaluation and control of noise hazards. Effects of noise on man. Medico-legal aspects of noise-induced hearing impairment.
Restriction: Permission of instructor.

HESP712 Cochlear Implants and Other Implantable Technologies (3 Credits)
Comprehensive presentation of cochlear implant design and processing, medical/surgical aspects, evaluation, programming, outcomes in children and adults, and post stimulation care. The role of the audiologist as a member of the cochlear implant team will be emphasized. Current and emerging trends in other implantable technologies also will be covered.
Prerequisite: Must have completed or be concurrently enrolled in HESP700, HESP701, and HESP722; or permission of instructor.

HESP722 Psychoacoutics (3 Credits)
Auditory perception and auditory processing in normal and impaired hearing.

HESP724 Research Design (3 Credits)
Evaluations of research designs, critique of published articles and student involvement in designing experiments on assigned topics.
Prerequisite: Must have completed a course in basic statistics.

HESP728 Advanced Clinical Practice in Speech (1-8 Credits)
Clinical internship in selected off-campus facilities.
Prerequisite: HESP648.
Restriction: Permission of instructor.
Repeatable to: 8 credits.

HESP729 Advanced Clinical Practice in Audiology (1-8 Credits)
Clinical internship in selected off-campus facilities.
Prerequisite: HESP649.
Restriction: Permission of instructor.
Repeatable to: 8 credits.

HESP730 Vestibular-ocular Assessment and Management (Electrophysiologic Measures II) (3 Credits)
Advanced principles and methods of evaluating vestibular-ocular function using electrophysiologic measures. Includes rehabilitative issues pertaining to balance disorders and advanced electrophysiologic measures of auditory system function.
Prerequisite: HESP630.

HESP788 Graduate Research Externship (1-3 Credits)
Off-campus research internship with departmental affiliates at National Institutes of Health and other regional universities. Contact department chairman for available placements, requirements and openings.
Recommended: HESP724.

HESP799 Master's Thesis Research (1-6 Credits)

HESP808 Current Research in Hearing, Speech and Language Services (1-3 Credits)
Current research in speech, language and hearing sciences and disorders.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP818 Seminar in Language Processing (3 Credits)
Information processing models of language, relationships among language, memory and cognition.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP828 Seminar in Hearing Science (3 Credits)
Recent developments in auditory psychophysics, and/or anatomy and physiology of the peripheral and central auditory mechanisms.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP829 Clinical Internship Residency (1-9 Credits)
Off-Campus, full-time (30-40 hours/week) clinical externship in Audiology at regional and national institutions.
Prerequisite: Must have completed HESP729 for two semesters; and must have completed the comprehensive exams successfully.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 18 credits if content differs.

HESP838 Seminar in Language Acquisition (3 Credits)
Models of normal and disordered first language acquisition, second language acquisition and bilingualism.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP848 Seminar in Audiology (3 Credits)
Research tipics realted to hearing assissment, amplification, and audiologic rehabilitation.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP849 Capstone Research Project I (2 Credits)
First of two-course sequence leading to the final research requirement for the Doctor of Audiology (Au.D.) degree; involves individual study and/or supervised lab work with mentor, preparation of research proposal (including IRB protocol if required), and attendance at Capstone Research Project Workshop.
Prerequisite: HESP724.
Restriction: Must not be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program.

HESP858 Seminar in Speech Pathology (3 Credits)
Problems in disordered articulation, voice, fluency and dysphagia.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP859 Capstone Research Project II (1-2 Credits)
Second of two-course sequence leading to the final research requirement for the Doctor of Audiology (Au.D.) degree; involves final data collection, analysis and presentation of results or completion of scholarly paper under the direction of the faculty mentor.
Prerequisite: Must have completed or be concurrently enrolled in HESP849.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program.

HESP868 Seminar in Speech Science (3 Credits)
Problems in speech acoustics and physiology.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP878 Seminar in Language Disorders (3 Credits)
Congenital and acquired language disorders of children and adults.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP879 Academic Research Seminar (1 Credit)
An overview of issues relevent to the research process will be provided.Topics rotate on a semester basis and include ethics, grantsmanship, professional presentations, research publications, and peer review of journal articles. A formal product (e.g., poster presentation, platform presentation, peer review, IRB application) will be required each semester.
Restriction: Must be in Hearing and Speech Sciences: Ph.D. (Doctoral) program.
Repeatable to: 3 credits if content differs.

HESP887 Academic Research Seminar (2 Credits)
This course has a focused, rotating set of topics each semester to cover professional and academic issues, including ethics, grantsmanship, professional presentations, professional publications, and peer review of journal articles.
Prerequisite: HESP724.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral)).
Repeatable to: 6 credits if content differs.

HESP888 Seminar in Neurological Bases of Language (3 Credits)
Neural ststrates of language function, brain image of normal and disordered language function, and neural plasticity for language.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP889 Doctoral Candidacy Research (1-3 Credits)
Doctoral candidacy paper research
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP898 Pre-Candidacy Research (1-8 Credits)

HESP899 Doctoral Dissertation Research (1-8 Credits)

HISP - Historic Preservation

HISP600 History, Theory, and Practice of Historic Preservation (3 Credits)
An introduction to history, theory and practice of historic preservation covered through readings, discussions, presentations, class projects, and field trips.
Prerequisite: Permission of ARCH-Historic Preservation Program.

HISP611 Historical Research Methods (3 Credits)
Research methods used by professional historic preservationists to identify and record historic structures and sites. Emphasizes inter/multidisciplinary nature of contemporary preservation practice using archival and ethnographic evidence as a basis for establishing significance.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP610 or HISP611.

HISP615 The Everyday and the "American" Environment (3 Credits)
An introduction into the theories of the everyday with the context of the American built environment. The course focuses primarily on the American experience of underrepresented, minority, and immigrant communities; both historical and contemporary. The course attempts to challenge what is meant by American in describing the American every day built environment.
Prerequisite: Permission of ARCH-Historic Preservation Program. Also offered as: HISP200.
Credit Only Granted for: HISP615, HISP619E, or HISP200.
Formerly: HISP619E.

HISP619 Special Topics in Historic Preservation (1-6 Credits)
Technical aspects of preservation taught by practitioners whose expertise are of special benefit to certificate students.
Repeatable to: 12 credits if content differs.

HISP628 Selected Topics in Historic Preservation (3 Credits)
Critical issues in contemporary preservation practice will be examined. Topics will change each year, according to the professor's interests and the relevance of the course topic, and will include such themes as: preservation of the everyday built environment, social and ethnic dimensions of historic preservation practice, and preservation of Modern architecture and landscapes. The course will consist of readings, class, discussions, and a substantial individual research project.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

HISP629 Independent Studies in Historic Preservation (1-3 Credits)
Individual Instruction course.
Restriction: Permission of ARCH-Historic Preservation Program.

HISP630 Preservation Policy and Planning (3 Credits)
An opportunity is provided to look in depth at the national historic preservation program that is the federal, tribal, state, and local (city and county) public sector preservation activities being undertaken in accordance with public policy set by laws, regulations, standards, and guidelines.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619M or HISP630.
Formerly: HISP619M.

HISP635 Social and Ethnic Issues in Historic Preservation Practice (3 Credits)
This seminar course examines the broader social and ethnic dimensions of historic preservation practice that have impacted the field since the "culture wars" of the 1990's. Through weekly case studies of local, international sites, students will explore these issues and apply newly emerging methodologies to their final case study project.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP628E or HISP635.
Formerly: HISP628E.

HISP640 Historic Preservation Law, Advocacy and Public Policy (3 Credits)
Introduce students to legal, advocacy, and public policy issues in the field of historic preservation. Student activities will be designed to teach basic working knowledge of relevant legal subjects, including historic preservation ordinances, state and federal preservation statutes, and important constitutional issues.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619C or HISP640.
Formerly: HISP619C.

HISP645 Archaeology and Preservation (3 Credits)
An introduction to issues related to archaeological resources and preservation. Topics will include method and theory in American archaeology, archaeology in support of architectural history, archaeology and the NHPA, archaeological site preservation and conservation, and curation and collections management. Students will have a chance to work at an archaeological site to experience field excavation techniques and challenges, and will visit other archaeological sites and curation facilities in the area.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619A or HISP645.
Formerly: HISP619A.

HISP650 Historic Preservation Studio Workshop (6 Credits)
Students carry out a group preservation project in a local community, from inception and problem formulation through completion. Guided carefully by a faculty team, students will conduct research, interact with communities, perform analyses, and propose solutions for an issue or problem of direct relevance to a local community and client group.
Prerequisite: HISP600; and permission of ARCH-Historic Preservation Program.
Restriction: Must be in a major in ARCH-Historic Preservation Program.

HISP655 American Vernacular Architecture (3 Credits)
History, theory, and practice of American vernacular architecture including a review of common building technologies, structure, and style, and focusing on methods and approaches for recording, documenting and analyzing these historic resources.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP655 or HISP619V.
Formerly: HISP619V.

HISP660 Internship in Historic Preservation (3 Credits)
Students will secure a summer internship with an organization engaged in historic preservation work (this can be a public agency, nonprofit, or private firm). The students will formulate a plan of work and a series of pedagogical goals to satisfy both the practical needs of the project and the academic requirements for the course.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Formerly: HISP619.

HISP670 Conservation of Historic Places: Historic Materials, Building Systems, and Conservation (3 Credits)
Introduces students to the analysis of historic buildings, building systems and materials. The overall emphasis is on assessing the condition of a building and its parts, and formulating a preservation strategy based on it. Conservation methods will be discussed through the introduction of philosophies and specific techniques.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619T or HISP670.
Formerly: HISP619T.

HISP678 Fieldwork in Historic Preservation (3 Credits)
Advanced fieldwork in research and documentation of historic sites and structures including primary local history research, building analysis, survey techniques, field photography, and graphic documentation techniques.
Repeatable to: 6 credits if content differs. Also offered as: ARCH676.

HISP679 Introduction to Measured Drawings for Historic Preservation (3 Credits)
Teaches graphic documentation methodologies for historic buildings, including hand measuring, drafting, preparing a sketch plan, analyzing buildings, and producing finished drawings in ink. Students will analyze building in situ.
Repeatable to: 6 credits if content differs. Also offered as: ARCH676.

HISP680 Preservation Economics (3 Credits)
Students are introduced to a range of economic theories, methods, and issues that must be considered in the practice of historic preservation. Case studies related to community economic development, adaptive reuse, tax credit programs, project finance, and land use will be presented.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619N or HISP680.
Formerly: HISP619N.

HISP701 Certificate Portfolio Project (1 Credit)
Students will gather samples of their work and craft a synthetic statement on their experiences in their HISP certificate courses (for example, picking up on themes such as community involvement, diversity of practice, affordable housing, or sustainability), and the ways in which they have integrated historic preservation into their thinking and practice in their home discipline.
Prerequisite: Permission of ARCH-Historic Preservation Program.

HISP710 Final Project in Historic Preservation I (1 Credit)
An independent, applied research project investigating the preservation of a particular site or a specialized issue in historic preservation. This is part one of a two-semester sequence and involves developing the project proposal and bibliography.
Credit Only Granted for: HISP700 or HISP710.
Formerly: HISP700.

HISP711 Final Project in Historic Preservation II (2 Credits)
An independent, applied research project invesitgating the preservation of a particular site or a specialized issue in historic preservation. This is part two of a two semester sequence and involves project research and writing.
Credit Only Granted for: HISP700 or HISP711.
Formerly: HISP700.

HIST - History

HIST401 Science and Gender (3 Credits)
Examines the role of women and gender in the history of science. Includes consideration of barriers to women's participation in science; women's role as scientific subjects and researchers; and questions about the scientific construction of gender and the gendered construction of science.
Credit Only Granted for: HIST401 or HIST429R.
Formerly: HIST429R.

HIST404 History of Modern Biology (3 Credits)
The internal development of biology in the 19th and 20th centuries, including evolution, cell theory, heredity and development, spontaneous generation, and mechanism-vitalism controversies. The philosophical aspects of the development of scientific knowledge and the interaction of biology with chemistry and physics.

HIST405 Environmental History (3 Credits)
An introduction to the key issues and methods of environmental history. The scope of the subject is discussed, as well as its relationship with other disciplines, such as ecology, anthropology, and geography. A primary focus is environmental change in history with emphasis on the American experience.

HIST406 History of Technology (3 Credits)
The changing character of technology in modern history, beginning with the Middle Ages. Concentrates on the Industrial Revolution and its aftermath, the nature of technological knowledge and the sources of technological change.

HIST407 Technology and Social Change in History (3 Credits)
Social consequences of technological innovations and the ways in which societies have coped with new technologies.

HIST408 Senior Seminar (3 Credits)
A capstone course for history majors, designed to increase historical knowledge and the ability to analyze texts and arguments. Topics will focus on the literature of a particular field and primary-source research.
Restriction: Must be in History program.
Repeatable to: 6 credits if content differs.

HIST412 History of Women and Gender in Africa (3 Credits)
An examination of socio-economic and cultural change in Africa from the dawn of the colonial era in the 19th century to independence in the mid-twentieth century. Major focus on how African women understood and responded to the expansion of European empires, changes in the colonial economy, and impact of westernization and urbanization.
Prerequisite: HIST122 or HIST123; or permission of ARHU-History department.
Credit Only Granted for: HIST412 or HIST428L.
Formerly: HIST428L.

HIST413 Revolutionary Prophets: Political and Religious Movements in Africa and the Atlantic World (3 Credits)
In the expanding nineteenth-century and twentieth-century culture of the "Black Atlantic" world, investigates the intersection of African cultures, modern nationalism, prophetism, millenarianism, and social change.
Recommended: HIST122 or HIST123.
Credit Only Granted for: HIST413 or HIST419V.
Formerly: HIST419V.

HIST415 Ideas and Politics in Europe Since 1900 (3 Credits)
Examination of intersection of ideas and politics in Europe since 1900. Focus will be on advocates of liberalism, social democracy, fascism, Nazism, communism, and conservatism and their impact on politics and policy since 1900.
Restriction: Permission of instructor.

HIST416 History of Slavery and the Slave Trade in Africa (3 Credits)
Examines the history and impact of the slave trade on African states, societies, and economies. Investigates the meaning of slavery in Africa, the local uses of slavery there and Africa's connections to the Trans-Saharan, Red Sea, and Trans-Atlantic slave trades.
Credit Only Granted for: HIST416 or HIST419Y.
Formerly: HIST419Y.

HIST417 Colonial Encounters: Natives, Spaniards, and Africans in the New World (3 Credits)
An exploration of the discourses and practices of the Spanish colonial project in the New World and the ways in which Indians and Blacks were incorporated into or excluded from that project. Also examines native and African resistance and adaptation to Spanish rule, and the process of transformation and hybridization of Spanish, native and African cultures in Spanish America. An analysis of recent historiographical developments that have profoundly changed the understanding of the Spanish conquest and colonization of the New World.
Recommended: HIST220 and HIST250.
Credit Only Granted for: HIST417 or HIST428Y.
Formerly: HIST428Y.

HIST418 Jews and Judaism: Selected Historical Topics (3 Credits)

HIST419 Special Topics in History (3 Credits)

HIST421 Medieval Heresies (3 Credits)
An examination of twelfth- and thirteenth-century heresies in the medieval West. Consideration of why so many heretics emerged, and how the church attempted to deal with them, and what effect their persecution had on Europe both then and later. Special attention given to groups that stood on the fine line between heresy and orthodox religion.
Credit Only Granted for: HIST408L or HIST421.
Formerly: HIST408L.

HIST425 Imperial Russia (3 Credits)
The rise and fall of the Russian Empire, Peter the Great to the collapse of tsarism in revolution. Emphasis on the evolution of autocracy, social groups, national identities, and cultural change.

HIST427 Age of Decline: Britain 1914 to Present (3 Credits)
British society since the First World War. The social, cultural, economic, and political impact of the First World War; labor and politics in the 1920s and 1930s; the inter-war Depression, appeasement and foreign policy; the social impact of the Second World War; the welfare state and nationalization of industry; the dissolution of Empire; the emergence of a consumer society; social criticism in the 1950s; the economic and political problems of the 1960s and 1970s.

HIST428 Selected Topics in History (3 Credits)

HIST429 Special Topics in History (3 Credits)

HIST430 Tudor England (3 Credits)
An examination of the political, religious, and social forces in English life, 1485-1603, with special emphasis on Tudor government, the English reformation, and the Elizabethan era.

HIST431 Stuart England (3 Credits)
An examination of the political, religious, and social forces in English life, 1603-1714, with special emphasis on Puritanism and the English revolutions.

HIST433 Strategic Military Theory: Clausewitz (3 Credits)
An exploration of Clausewitzian thought. Topics include the conduct of fighting and war planning, the relationship of war and politics, guerrilla war, the principles of concentration of force, the Clausewitzian trinity, absolute war and real war, unlimited and limited war, the relative strengths of the defense and the attack, and the intuitive sources of strategic decision.
Credit Only Granted for: HIST419J or HIST433.
Formerly: HIST419J.

HIST436 Napoleon, the French Revolution and the World (3 Credits)
An argument for the broad continuity between the revolutionary and Napoleonic wars.

HIST437 Modern France from Napoleon to DeGaulle (3 Credits)
The changing political and cultural values of French society in response to recurrent crises throughout the 19th and 20th centuries. Students should have had some previous survey of either Western civilization or European history.

HIST440 Germany in the Nineteenth Century, 1815-1914 (3 Credits)
Examines the social, economic, cultural, and political development of the major German states before 1871 and of Germany, excluding Austria, from 1871 to 1914.

HIST441 Germany Since 1900 (3 Credits)
Course places Nazism in context of German and European history. Topics include collapse of German democracy and the establishment of the Nazi dictatorship; the role of Hitler; the response of political, military, economic, diplomatic, legal, media, theological elites and the broader population; the mix of terror, consent and coercion; propaganda and Nazi culture; contours of Nazi racial ideology and anti-Semitism and their impact on domestic and foreign racial policy; the economic history of the Nazi regime; foreign policy from rearmament to launching World War II to expansion and defeat; Jewish policy from the years of persecution to those of extermination; Nazi policy in Eastern and Western Europe, towards the United States, and towards North Africa and the Middle East; why the Allies won World War II and why and how Nazi Germany was defeated; the nature of the Allied occupation after 1945; the Nuremberg war crime trials; aftermath of facing and avoiding the crimes of the Nazi regime in West and East Germany.

HIST442 Twentieth-Century Russia (3 Credits)
Russia and the Soviet Union from the fall of the tsars to the post-communist present. Impact of Leninism, Stalinism, and Soviet Communism on state, society, culture, and nationality.

HIST446 Old Regime France, 1589-1789 (3 Credits)
An exploration of the demographic patterns of the seventeenth and eighteenth centuries. Examination of arguments that the population was governed by Malthusian constraints; the social structure of the time; the nature of the elites; the debate over the phrase "rise of the bourgeoisie"; the Enlightenment both as an intellectual phenomenon and as a social agent; and arguments that Enlightenment led to the desacralization of the monarchy.
Credit Only Granted for: HIST419I or HIST446.
Formerly: HIST419I.

HIST447 Riot, Law and Justice in European History (3 Credits)
An examination of the role of violence and the attempt of law to contain or punish it. Major interpretations of societal codes of honor, retribution, and punishment, and how violence is governed by these codes.
Credit Only Granted for: HIST428C or HIST447.
Formerly: HIST428C.

HIST450 Economic History of the United States to 1865 (3 Credits)
The development of the American economy from Columbus through the Civil War.
Prerequisite: HIST200, HIST210, HIST213, HIST222, HIST254, HIST275, or HIST311; or must have completed HIST156; or permission of instructor.

HIST451 Economic History of the United States After 1865 (3 Credits)
The evolution of the U.S. economy from the end of the Civil War to the present; emphasis on macroeconomic policy making and relations among business, government, and organized labor.
Prerequisite: HIST201, HIST211, HIST213, HIST222, HIST255, or HIST275; or must have completed HIST157; or permission of instructor.

HIST452 Diplomatic History of the United States to 1914 (3 Credits)
American foreign relations from the American Revolution to the beginning of World War I. International developments and domestic influences that contributed to American expansion in world affairs. Analyses of significant individuals active in American diplomacy and foreign policy.

HIST453 Diplomatic History of the United States from 1914 (3 Credits)
American foreign relations in the 20th century. World War I, the Great Depression, World War II, the Cold War, the Korean War, and Vietnam. A continuation of HIST452.

HIST454 Constitutional History of the United States: From Colonial Origins to 1865 (3 Credits)
The interaction of government, law, and politics in the constitutional system. The nature and purpose of constitutions and constitutionalism; the relationship between the constitution and social forces and influences, the way in which constitutional principles, rules, ideas, and institutions affect events and are in turn affected by events. The origins of American politics and constitutionalism through the Constitutional Convention of 1787. Major constitutional problems such as the origins of judicial review, democratization of government, slavery in the territories, secession, and civil war.

HIST455 Constitutional History of the United States: Since 1865 (3 Credits)
American public law and government, with emphasis on the interaction of government, law, and politics, and the relationship between the constitution and social forces and influences, the way in which constitutional principles, rules, ideas, and institutions affect events and are in turn affected by events. Major crises in American government and politics such as Reconstruction,the rise of corporate power, civil liberties during wartime, the New Deal era, the civil disorders of the 1960s.

HIST457 History of American Culture and Ideas Since 1865 (3 Credits)
A continuation of HIST456, from the Civil War to the present.
Prerequisite: HIST201, HIST211, HIST213, HIST222, HIST255, or HIST275; or must have completed HIST157; or permission of instructor.

HIST459 Society in America: Historical Topics (3 Credits)
A consideration of selected aspects of American society from colonial times to the present. Special emphasis on regionalism, immigration, nativism, minorities, urbanization, and social responses to technological changes.
Repeatable to: 6 credits if content differs.

HIST460 History of Labor in the United States (3 Credits)
The American working class in terms of its composition; its myths and utopias; its social conditions; and its impact on American institutions.
Prerequisite: HIST200, HIST201, HIST210, HIST211, HIST222, HIST255, or HIST275; or must have completed HIST156 or HIST157; or permission of instructor.

HIST461 Blacks in American Life: 1865 to Present (3 Credits)
The role of the Black in America since slavery, with emphasis on 20th-century developments: migration from farm to city; growth of the civil rights movement; the race question as a national problem.
Prerequisite: HIST201, HIST210, HIST211, HIST222, HIST254, HIST255, or HIST275; or must have completed HIST157; or permission of instructor.

HIST462 Slavery, Sectionalism, and the U.S. Civil War (3 Credits)
Slavery, sectionalism, and the coming of the Civil War. Resources and strategy of the Confederacy and the Union, the war's changing character, emancipation and its consequences, conditions on the home front, and the wartime origins of Reconstruction.
Prerequisite: HIST200, HIST213, HIST222, HIST254, or HIST275; or must have completed HIST156; or permission of instructor.

HIST463 History of the Old South (3 Credits)
The golden age of the Chesapeake, the institution of slavery, the frontier South, the antebellum plantation society, the development of regional identity, and the experiment in independence.

HIST466 Immigration and Ethnicity in the U.S. (3 Credits)
Seminar exploring historical problems relating to US immigration, race, and ethnicity since 1848, with emphasis on cultural impacts of migration on immigrants, their children, and U.S. society.
Prerequisite: AAST200, AAST201, AAST222, HIST200, HIST201, HIST221, or HIST222; or must have completed HIST156 or HIST157; or permission of ARHU-History department.
Credit Only Granted for: AAST498L or HIST466.

HIST467 Women and Reform Movements in the Twentieth-Century United States (3 Credits)
Investigation of women's participation in such twentieth-century reform movements as the labor movement, the struggle for racial justice, social welfare reform, and women's movements. Will ask how race, class, and gender were implicated in the ways that women agitated for social political change.
Recommended: HIST201, HIST211, or HIST255.
Credit Only Granted for: HIST467 or HIST429E.
Formerly: HIST429E.

HIST469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

HIST471 History of Brazil (3 Credits)
The history of Brazil with emphasis on the national period.
Prerequisite: LASC234, HIST251, HIST250, or LASC235; or permission of instructor.

HIST473 History of the Caribbean (3 Credits)
Offers a concise introduction to the history of the Caribbean regions from the Columbian voyages to the 20th century. Special emphasis is given to the dynamics of local social and cultural formations within the framework of the political and economic history of the Atlantic world.
Prerequisite: HIST112, HIST113, HIST122, HIST123, HIST240, HIST250, or HIST251.

HIST474 History of Mexico and Central America I (3 Credits)
History of Mexico and Central America, beginning with the pre-Spanish Indian cultures and continuing through European contact, conquest, and colonial dominance, down to the beginning of the Mexican War for Independence in 1810.
Prerequisite: LASC234, HIST251, or LASC235; or permission of instructor.

HIST475 History of Mexico and Central America II (3 Credits)
A continuation of HIST474 with emphasis on the political development of the Mexican nation.
Prerequisite: LASC234, HIST251, or LASC235; or permission of instructor.

HIST476 Jews in Medieval Times 1000-1450 (3 Credits)
Social and cultural life of Jewish communities spread throughout Islam and Christendom. Major topics include the Gaonate, kehila organizations, legal, rationalist, and mystical thought, and the context of rising animosity against Jews linked to the Crusades and changing Church doctrines.
Recommended: HIST282 or JWST234; and (HIST330 or HIST331). Also offered as: JWST432.
Credit Only Granted for: HIST419R, HIST476, JWST429M, or JWST432.
Formerly: HIST419R.

HIST477 Transnational Blackness in the Americas (3 Credits)
The African diaspora is a concept that attempts to comprehend the shared experiences of African-descended peoples throughout the world, particularly in the Americas. While many of these peoples identify with a particular nationality (being Brazilian, Cuban, or from the United States above or alongside being black, of color, or of African descent), many of them have forged connections with each other across national boundaries and recognized commonalities that transcend their national contexts. This class will use fiction, memoir, and recent historical scholarship to explore the history of the links that Afro-Latin American and Afro-North Americans have created in the nineteenth and twentieth centuries. Ultimately, the course will help us understand the historical possibilities and limitations of conceiving of African Americans as a hemispheric, transnational social group.

HIST481 A History of Modern China (3 Credits)
Modern China from 1644 to the People's Republic of China. Emphasis on the coming of the West to China and the various stages of the Chinese reaction.

HIST482 History of Japan to 1800 (3 Credits)
Traditional Japanese civilization from the age of Shinto mythology and introduction of continental learning down to the rule of military families, the transition to a money economy, and the creation of a townsmen's culture. A survey of political, economic, religious, and cultural history.

HIST483 History of Japan Since 1800 (3 Credits)
Japan's renewed contact with the Western world and emergence as a modern state, industrial society, and world power, 1800-1931; and Japan's road to war, occupation, and recovery, 1931 to the present.

HIST484 Cultural History of the Chinese Revolutions (3 Credits)
Examines the cultural origins, experience, and results of the Cultural Revolution in China.
Recommended: HIST481 or HIST285.
Credit Only Granted for: HIST419G or HIST484.
Formerly: HIST419G.

HIST486 Social Issues in Modern China (3 Credits)
Explores the problems surrounding family, community, and social life in modern China, including a focus on issues that affect groups and subcultures within the population. Examines as well the political system's capacity to regulate this complex society.
Recommended: HIST285; and HIST481.
Credit Only Granted for: HIST419N (Fall2007) or HIST486.
Formerly: HIST419N.

HIST491 History of the Ottoman Empire (3 Credits)
Survey of the Ottoman Turkish Empire from 1300 A.D. to its collapse during World War I. Emphasis on the empire's social and political institutions and its expansion into Europe, the Arab East and North Africa.

HIST492 Women and Society in the Middle East (3 Credits)
Examines the customs, values, and institutions that have shaped women's experience in the Middle East in the past and in the contemporary Middle East.
Recommended: Must have completed prior coursework in Middle East studies or gender studies. Also offered as: WMST456.
Credit Only Granted for: HIST492 or WMST456.

HIST493 Victorian Women in England, France, and the United States (3 Credits)
Examines the lives of middle- and upper-class women in England, France, and the United States during the Victorian era. Topics include gender roles, work, domesticity, marriage, sexuality, double standards, and women's rights.Also offered as: WMST453.
Credit Only Granted for: HIST493 or WMST453.

HIST495 Women in Medieval Culture and Society (3 Credits)
Medieval women's identity and cultural roles: the condition, rank and rights of medieval women; their access to power; a study of women's writings and the constraints of social constructs upon the female authorial voice; and contemporary assumptions about women.Also offered as: WMST455.
Credit Only Granted for: HIST495 or WMST455.

HIST499 Independent Study (1-3 Credits)

HIST601 History and Contemporary Theory (3 Credits)
An introduction to contemporary theories in philosophy, literary criticism, cultural studies, anthropology, and other fields; and analysis of their usefulness to historians.

HIST606 Seminar in the History and Philosophy of Science and Technology (3 Credits)
Fundamental problems and current research in the history of science and technology; theories of historical change applied to selected cases in physical and biological science and in technology; historiographic and philosophical issues pertaining to these cases.
Credit Only Granted for: HIST606 or PHIL650.

HIST607 The Teaching of History in Institutions of Higher Learning (1 Credit)

HIST608 General Seminar (3 Credits)
General seminar in student's major field of study (e.g., U.S.; Women and Gender; International, World, and Comparative; Science and Technology; Latin America) exploring the concentration's major issues, topics, and literature.
Restriction: Permission of ARHU-History department.
Repeatable to: 9 credits if content differs.

HIST609 Readings in the History of Science and Technology (3 Credits)

HIST610 Introduction to Museum Scholarship (3 Credits)
Provides students a basic understanding of museums as cultural and intellectual institutions. Topics include the historical development of museums, museums as resources for scholarly study, and the museum exhibition as medium for presentation of scholarship.Also offered as: AMST655.
Credit Only Granted for: AMST655, ANTH655, or HIST610.

HIST618 Readings in Women's and Gender History (3 Credits)

HIST619 Special Topics in History (1-3 Credits)

HIST628 Readings in Colonial American History to 1763 (3 Credits)
Major historical literature on various groups and developments in the European colonies that later became the United States through the period ending with the British-French "Great War for Empire."

HIST629 Readings in the American Revolution and New Nation, 1763 to 1812 (3 Credits)

HIST638 Special Topics in History (3 Credits)
Special Topics in History.
Repeatable to: 9 credits if content differs.

HIST639 Special Topics in History (3 Credits)
Special Topics in History.
Repeatable to: 9 credits if content differs.

HIST648 Readings in Early 20th-Century America, 1900-1941 (3 Credits)
Major historical literature on various groups and developments in the United States between the Progressive Era and the beginning of World War II.

HIST649 Readings in Recent American History, 1941-Present (3 Credits)
Key subjects, themes, and historiographic debates in the history of the United States from 1941 to the present.

HIST658 Readings in American Constitutional and Legal History (3 Credits)
Historical literature on the American constitutional order from the colonial foundations to the present. The founding and development of political and constitutional institutions examined from the perspectives of law, politics, government and political philosophy.

HIST659 Readings in American Cultural and Intellectual History (3 Credits)
Major historical literature pertinent to the cultural/intellectual development of the varied peoples of the United States.

HIST668 Readings in American Social History (3 Credits)
Major historical literature related to specific issues in the social history of the United States.

HIST669 Readings in U.S. Economic and Business History (3 Credits)
An overview of U.S. economic and business history and historiography from colonial times to the present. Emphasizes the methodologies of "new" economic historians and institutional business historians, the evolving role of the state in the American economy, and cultural dimensions of economic change.
Repeatable to: 6 credits.

HIST678 Readings in American Labor History (3 Credits)
Major historical literature related to the development of the American working class, the labor movement, and gender/racial/ethnic issue within them.

HIST679 Readings in the History of American Foreign Policy (3 Credits)
Major historical literature related to the diplomacy and international relations of the United States.

HIST689 Readings in Southern History (3 Credits)
Major historical literature centered on the development and peoples of the southern United States.

HIST698 Professional Internship (3 Credits)
Internship with a professional organization in the historical disciplines or related fields.
Restriction: Must be in one of the following programs (History (Master's); History (Doctoral)).
Repeatable to: 6 credits if content differs.

HIST708 Directed Independent Reading for Comprehensive Examinations I (1-4 Credits)
Directed reading in preparation for Doctoral Comprehensive Examinations. In consultation with their advisors, students will select a number of books and articles from an approved list. Grading for the course will reflect performance on the written and oral sections of the Comprehensive Examinations.
Restriction: Permission of ARHU-History department.
Repeatable to: 12 credits if content differs.

HIST709 Directed Independent Reading for Comprehensive Examinations II (1-4 Credits)
Directed reading in preparation for Doctoral Comprehensive Examinations. In consultation with their advisors, students will select a number of books and articles from an approved list. Grading for the course will reflect performance on the written and oral sections of the Comprehensive Examinations.
Repeatable to: 12 credits if content differs.

HIST711 Final Project in Historic Preservation II (2 Credits)
An independent, applied research project investigating the preservation of a particular site or a specialized issue in historic preservation. This is part two of a two-semester sequence and involves project research and writing.
Credit Only Granted for: HISP700 or HISP711.
Formerly: HISP700.

HIST718 Readings in Medieval History (3 Credits)

HIST719 Readings in the History of the Renaissance and Reformation (3 Credits)

HIST720 Readings in the History of the Catholic Church (3 Credits)
This is graduate-level readings seminar in the modern history of the Catholic Church. We will begin with the Reformation and proceed through the present day. This course will combine European history with global history, looking both at how the Church changed in the face of major turning points in modern European history (the Scientific, French, and Russian Revolutions; the two world wars; and the Cold War) and at its missionary encounters and long-term presence across the world (in Latin America, India, China, Africa, and North America).

HIST729 Readings in Modern European History (3 Credits)
Reading knowledge of some European language recommended but not required.

HIST739 Readings in the History of Great Britain (3 Credits)

HIST748 Readings in Modern French History (3 Credits)

HIST749 Readings in German History, 1815 to the Present (3 Credits)
Reading knowledge of German is encouraged, but not required.
Repeatable to: 9 credits if content differs.

HIST758 Readings in Eastern European History (3 Credits)
Selected topics in the history of the Hapsburg monarchy and the successor states, Poland and the Balkans. Emphasis on the rise of nationalism during the 19th century and the experience with fascism and communism in the 20th century.
Repeatable to: 6 credits if content differs.

HIST759 Readings in Russian and Soviet History (3 Credits)

HIST768 Readings in Chinese History (3 Credits)

HIST778 Readings in Latin American History (3 Credits)

HIST779 Readings in Middle Eastern History (3 Credits)

HIST789 Readings in Modern European Intellectual History (3 Credits)

HIST798 Readings in Jewish History (3 Credits)
Readings on selected topics in Jewish history. Emphasis on analysis of primary sources. Reading knowledge of Hebrew recommended.
Repeatable to: 6 credits.

HIST799 Master's Thesis Research (1-6 Credits)

HIST808 Seminar in the History of Science and Technology (3 Credits)

HIST809 Seminar in the History of Women and Gender (3 Credits)

HIST810 Museum Research Seminar (3 Credits)
A research seminar focusing on the practice and presentation of cultural and historical scholarship in museums and historical sites. Students will complete an original research project on the challenges and opportunities of public exhibition and interpretation of cultural and historical research.
Prerequisite: HIST610. Also offered as: ANTH856, AMST856.
Credit Only Granted for: AMST856, HIST810, or ANTH856.

HIST811 Museum Scholarship Practicum (3-6 Credits)
Students devise and carry out a research program using the collections at the Smithsonian Institution or some other cooperating museum, working under joint supervision of a museum professional and a university faculty member.
Prerequisite: HIST810.
Restriction: Permission of Museum Scholarship Program required. Also offered as: ANTH857, AMST857.
Credit Only Granted for: ANTH 857, AMST857 or HIST811.

HIST819 Special Topics in History: Independent Research (1-3 Credits)
Individual graduate research in an area not covered by current seminar offerings. The product will be a finished research paper normally based on original materials.
Restriction: Must be in History program; and permission of ARHU-History department.
Repeatable to: 6 credits if content differs.

HIST829 Seminar in Latin American History (3 Credits)

HIST838 Seminar in Ancient History (3 Credits)

HIST839 Seminar in Medieval and Early Modern European History (3 Credits)

HIST848 Seminar in Modern European History (3 Credits)

HIST849 Seminar in Russian and Soviet History (3 Credits)

HIST869 Seminar in Recent American History (3 Credits)

HIST878 Seminar in Colonial American History (3 Credits)

HIST879 Seminar in the American Revolution and Formative Period (3 Credits)

HIST880 Seminar in Southern History (3 Credits)

HIST888 Seminar in the Middle Period and Civil War (3 Credits)

HIST898 Pre-Candidacy Research (1-8 Credits)

HIST899 Doctoral Dissertation Research (1-8 Credits)

HLHP - Health and Human Performance

HLHP615 Crises of Aging: Time, Retirement and Widowhood (3 Credits)
A cross-disciplinary and multidisciplinary investigation of phenomena which comprise a significant portion of the issues confronting an older adult's life: (1) introduction to multiple processes of adulthood and aging; (2) the concepts and meaning of time; (3) pre-retirement and retirement adjustments; and (4) loss and widowhood.
Formerly: PERH615.

HLHP625 Issues in Retirement: Theory and Practice (3 Credits)
Multidisciplinary examination of retirement phenomena, including theories of transition, government and private sector policies, social expectations, physical correlates, personal adjustments, and economic consequences. Emphasis upon research utilization.
Formerly: PERH625.

HLHP688 Field Work in Aging (1-6 Credits)
Sequences of supervised field experience in the field of aging, including direct service, administration, research, or training. Emphasis on career exploration and assessment in relation to the field of aging.
Prerequisite: Permission of SPHL-School of Public Health.
Formerly: PERH688.

HLHP689 Selected Problems in Health, Physical Education and Recreation (1-6 Credits)
Research projects in special areas in health, physical education and/or recreation which have interdisciplinary implications not covered in structured courses.
Formerly: PERH689.

HLHP780 Interdisciplinary Issues in Aging (3 Credits)
Multidisciplinary approaches to the processes of aging to achieve a more holistic understanding. Pedagogical research dissemination, peer instruction, guest lecturing, and informal discussion. The demonstration of the multilateral nature of growing older. Discussion of cross-disciplinary and interdisciplinary research proposals.
Formerly: PERH780.

HLMN - Hillman Entrepreneurs Program

HLMN470 Fundamentals of Entrepreneurial Ventures (3 Credits)
Learn the processes and skills needed to launch and manage start-up ventures, including technology startups. Assess the feasibility of a startup ventures, as well as how to apply best practices for planning, launching, and managing new companies by using real-world examples and in-depth case studies. Discuss a wide range of issues of importance and concern to entrepreneurs and learn to recognize opportunity, assess the skills and talents of successful entrepreneurs, and learn models and approaches that help navigate uncertainty.
Restriction: Restricted to students in the Hillman Entrepreneurs Program.
Credit Only Granted for: HLMN470, ENES460 or BMGT461.
Additional Information: HLMN470 may not count toward any BMGT major or minor degree.

HLMN471 Entrepreneurial Finance (3 Credits)
Examine the elements of entrepreneurial finance, develop and analyze financial statements, focusing on technology-based startup ventures and the early stages of company development. Address key questions that challenge all entrepreneurs: how much money can and should be raised; when it should be raised and from whom; how to define a reasonable valuation of a company; and how to structure funding, develop employment contracts, and make exit decisions. Analyze the variety of financing models across a venture's life cycle, with an aim to understanding the incentives of each type of investor and the relative costs and benefits of each source of funding.
Restriction: Restricted to students in the Hillman Entrepreneurs Program.
Credit Only Granted for: HLMN471, ENES466 or BMGT365.
Additional Information: HLMN471 may not count toward any BMGT major or minor degree.

HLMN472 Strategies for Innovation & Entrepreneurship (3 Credits)
Understand the process of technological change; the ways that firms come up with innovations; the strategies that firms use to benefit from innovation; and how to create new value not only through new products or services, but with novel technologies, business concepts, organizing structures, transaction/financing mechanisms, distribution channels, and market segmentation. Challenge students to think about how to create value and build a productive business organization with available resources (e.g. intelligence, insight, energy, initiative and personal relationships).
Restriction: Restricted to students in the Hillman Entrepreneurs Program.
Credit Only Granted for: HLMN472, BMGT467, or ENES463.
Additional Information: HLMN472 may not count toward any BMGT major or minor degree.

HLMN473 Consulting in Tech Entrepreneurship (3 Credits)
Apply the entrepreneurship/business principles learned in the classroom to real-world consulting projects. Gain practical experience by solving actual business situations and by dealing with ambiguity and uncertainty inherent in fast-moving technical organizations. Develop key skills in negotiation, group dynamics, organization, and planning.
Restriction: Restricted to students in the Hillman Entrepreneurs Program.
Additional Information: HLMN473 may not count toward any BMGT major or minor degree.

HLSA - Health Services Administration

HLSA484 Redesigning Health Care: Developing a Clinic to Meet Community Needs (3 Credits)
Provides an opportunity for students to learn a key entrepreneurial skill, Design Thinking, while helping to build, reshape, redesign and transform delivery of health care in the Mona Center, a new community center and clinic in Prince George's County. This new, modern vision for a health and wellness clinic embraces student involvement in designing, planning and contributing to innovative programs, solutions, and processes to improve the clinic's ability to meet community and patient needs by addressing the social determinants of health as well as traditional clinical health status. Students in the class will develop empathy for patients, providers and other stakeholders, define problems, select a specific problem for intervention, understand problems based on stakeholder input, ideate, reframe and suggest options to solve or address the problem, prototype solutions, test ideas, and make recommendations to inform implementation and ongoing measurement and monitoring of impact.
Restriction: Must have completed a minimum of 60 credits.
Additional Information: Two sessions will be on-site at the Mona Clinic in Temple Hills, MD, and the remaining sessions will be taught in the University of Maryland's Academy for Innovation and Entrepreneurship.

HLSA601 Introduction to Health Systems (3 Credits)
Management and leadership skills for effective public health planning, organization, management and administration. Emphasis is on the role of institutions in learning and behavioral change process, organizational theory, administration management, and coordinating provision of community health services.
Restriction: Must not have completed HLTH740.
Credit Only Granted for: HLSA601, HLTH688A, or HLTH740.
Formerly: HLTH688A or HLTH740.

HLSA611 Introduction to Health Equity (3 Credits)
The emerging field of health equity is concerned with understanding the causes and consequences of social disparities in population health. This course is designed to expose students to the foundational issues in health equity from a variety of perspectives. Through weekly meetings and discussion, students will develop familiarity with the major literature in the field of health equity. The course is divided into three sections: (1) Understanding & Addressing Health Disparities; (2) Disparity Populations; and (3) Solutions in Health Equity. Students will gain understanding of the dimensions and sources of health inequality, including race/ethnicity, socioeconomic status, gender, nativity, and sexual minority status. Current policy debates and recent policy developments related to health equity are also briefly discussed.

HLSA688 Independent Study (1-6 Credits)
Master or doctoral students who desire to pursue special research problems under the direction of a faculty memeber of the department may register for 1-6 hours of credit under this number.
Prerequisite: Permission of SPHL-Health Services Administration department.
Repeatable to: 9 credits if content differs.

HLSA689 Field Work in Aging (1-6 Credits)
Individual instruction course.
Prerequisite: Permission of SPHL-Health Services Administration department.
Repeatable to: 6 credits if content differs.
Formerly: SPHL688.

HLSA702 Policy and Politics of Health (3 Credits)
Organizational and financial components of the U.S. health care system, including social and political forces that bind the system. Advanced political analysis of the health care system, including key issues and problems.

HLSA703 Seminar in Health Equity (1 Credit)
Student-led presentations and discussion of contemporary literature in the areas of health disparities and health equity, social determinants, (eg. race, ethnicity, sex, age, sexual identity, disability, socioeconomic status, and geographic location) and policies and programs to address disparities. The emphasis is on papers describing new research findings, novel techniques, innovative methods, and emerging issues.

HLSA709 Graduate Seminar (1 Credit)
The purpose of the course is for doctoral students to present their work on their dissertation to fellow doctoral students and faculty in an informal supportive environment. Faculty and students provide feedback and suggestions that are helpful to the presenting students.
Prerequisite: HLSA doctoral students admitted to candidacy.
Restriction: Must be HLSA doctoral student admitted to candidacy.
Repeatable to: 4 credits if content differs.

HLSA710 Healthcare Mangement: Foundations and Principles (3 Credits)
Concepts and managerial activities essential to achieve the goals of health care organizations are examined and discussed. Managerial processes include planning, decision-making, etc. required to operate and change health care organizations will be discussed. Special emphasis will be placed on the leader/managers role in developing and maintaining an effective system for providing healthcare.
Restriction: Must be in Master of Health Administration (Master's) program; or must be in Health Services Ph.D. (Doctoral) program.

HLSA711 Health Economics and Analysis (3 Credits)
Provides an analysis of health and health care services as economic goods. Using microeconomic theories, we will examine the behavior of health care providers, consumers, markets, and firms.

HLSA713 Seminar in Health Policy (1 Credit)
Student-led presentations of contemporary literature in the areas of health policy, health care reform in the nation and Maryland, and evaluation of health policies and programs. Emphasis on papers describing new research findings, novel techniques, innovative methods, and emerging issues.

HLSA714 Economic Evaluation of Medical Care (3 Credits)
An overview of the theory and applications of cost-benefit analysis, cost-effectiveness analysis, and related forms of economic evaluation/ decision analysis in the health care sector.
Prerequisite: HLSA601 and EPIB650; or students who have taken courses with comparable content may contact the department.

HLSA720 Health Law and Ethics (3 Credits)
The legal system helps determine the relationships prevailing among individuals, institutions and governments by setting out the rights, duties and powers of the various parties. This course will look at some of the more important concepts the law uses within the context of health services and public health.

HLSA721 Using Demographic Data for Health Policy Analysis (3 Credits)
The goal of this course is to introduce students to the major demographic data sets that are used in health policy research and to provide hands-on experience using these data to answer policy oriented research questions
Prerequisite: EPIB650; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Additional Information: Priority enrollment will be given to students in the Department of Health Services Administration programs.

HLSA723 Health Policy Analysis and Advocacy (3 Credits)
Examination of the politics of the health policy process, including the effects of American political structure and institutions; economic and social factors; interest groups, classes, and social movements; media and public opinion, and other factors. The emphasis is both on understanding how public policy is made as well as how to influence the process.Students will learn about (1) how health policy is developed, adopted, and implemented, (2) the political, institutional, economic, social, and other factors that influence and shape the process, and (3) the basic approaches and tools of strategic advocacy.
Prerequisite: HLSA601.

HLSA725 Econometrics in Public Health (3 Credits)
Empirical course to introduce students to econometric methods and their applications in public health.
Prerequisite: EPIB650; or students who have taken courses with comparable content may contact the department.
Additional Information: priority enrollment will be given to students at the School of Public Health.

HLSA730 Healthcare Human Resources (3 Credits)
Provides an introduction to the management of human resources in the healthcare setting using basic human resources management doctrine common to all industries. Content includes principles and methods of personnel including employment, recruitment, selection, retention, training and development, compensation including wage and salary administration performance appraisal, job analysis and labor relations.

HLSA733 Topics in Health Care Reform (3 Credits)
An overview of the Patient Protection and Affordable Care Act of 2010 (ACA) and the major health care reforms explicitly included in the law, while also considering the state implementation decisions and provider innovation that has occurred over time due to the ACA is provided. It will address issues of implementation of Medicaid expansion, the state and federal Exchange, costs of care and efficiency, improving quality and patient safety as well as prevention and public health. We will discuss the actual process of passing the law, what compromises were made, the funding sources, recent changes, regulations, state decisions, waivers, and demonstration or pilot programs that have been developed and/or funded due to the law. We will also focus on the implementation of the law in Maryland, where the legislature and governor decided to expand Medicaid and create a state-based insurance exchange. However, the impacts of the law could be different in Maryland than in other states due to the population, moderate politics, and the presence of state price setting authority for hospitals and other providers.
Prerequisite: HLSA601, HLSA702, or HLSA711.

HLSA740 Healthcare Strategic Planning and Marketing (3 Credits)
An understanding of strategic management and marketing is provided which enables the students to lead the process of strategic planning in a healthcare organization. By conducting a marketing and strategic planning process, health care organizations are better able to cope with dramatic changes in technological, social, political, regulatory, and competitive aspects of the health care market. Strategic management enables organizations to identify issues unique to them, which hinder or promote organizational success. Through course readings, class discussions, analyses of secondary quantitative and qualitative data, and presentation of case studies, students gain a thorough understanding of the strategic management process. Students will apply core competencies through a comprehensive strategic and marketing plan. Plans will be defended through an oral presentation.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA745 Public Health Practice and Management (3 Credits)
Examines the relationship of practice and management in performing essential public health services on local, state and national levels.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA750 Healthcare Management Information Systems (3 Credits)
Provides a background and overview of the analysis, design, evaluation, selection, installation, use, and mangement of information systems in health care settings. Students will review the information management function and value of information and the role of information technology in the provision of high quality care and management decision making. Details on computer hardware, software, networking, and telecommunications sufficient for understanding of concepts relevant to health care managers and staff will be addressed.

HLSA760 Healthcare Financial Management (3 Credits)
Offers content in health services financial management with emphasis on applying traditional financial theories to health care and the health care system. Focus on decision-making using accounting and finance theories, principles, concepts and techniqes most important to health care leaders.

HLSA765 Dissertation Proposal Development Seminar (3 Credits)
Designed to support doctoral students prepare their dissertation proposal and oral presentation. The course is structured around a literature synthesis and development of a modified AHRQ R36 grant application which includes developing a research question and hypotheses, a conceptual model, specific aims, background and significance, and research strategy. The importance of communicating complex ideas through oral and written forms will be emphasized.
Recommended: Completed all coursework related to one?s dissertation topic; and identified in collaboration with one?s dissertation advisor a topic area and potential data set.
Restriction: Must be in Health Services Ph.D. (Doctoral) program; or permission of instructor. And must have passed departmental qualifying exam.

HLSA766 Foundational Readings in Health Services Research (3 Credits)
An overview of the foundational papers that inform health services research and its related disciplines; including literature on key conceptual models, classic empirical studies, and research illustrating cutting edge methods or findings. The major theoretical frameworks and empirical challenges of the field will be examined through critical reading and discussion among students. The course is organized around preparation for the qualifying exam in the Health Services Ph.D. program.
Prerequisite: Completion of the six HLSA Health Services Research core courses.
Restriction: Must be in Health Services Ph.D. (Doctoral) program.

HLSA770 Continuous Quality Improvement in Healthcare (3 Credits)
Designed for the health care professional or administrator involved in quality assurance in health care. Course includes historical beginnings, state-of-the-art, voluntary, governmental efforts, and tools to promote quality assurance.

HLSA772 Healthcare Leadership and Communications (3 Credits)
Health care administrators rely on transformational leadership skills and insights to help their organizations rise to the social financial, public health, and technological challenges of the future. Students will assess and develop their leadership strengths, apply key leadership communication principles, and critically analyze relevent leadership models, exploring their utility in addressing key leadership issues in health care organizations. An underlying theme will be the identification of core values involved in health care delivery, integration of those values in personal and organizational missions, and effective communication to stakeholders.

HLSA775 Public Health Research (3 Credits)
Provides an interdisciplinary approach to gaining an understanding of and acquiring the skills to conduct public health research. This course covers policy and social issues, theory, and methods of evaluation and participatory research, from simple community based health programs to large-scale interventions. The course emphasizes experimental and quasi-experimental designs to estimate program impact as well as evaluation of program implementation. Case studies drawn from the public health field illustrate various types of evaluations and participatory research initiatives. Lectures, interactive discussions, group projects, individual projects and related assignments.
Prerequisite: EPIB650.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA777 Program Evaluation Field Experience (3 Credits)
Program evaluation is a critical component in designing and operating effective programs. Organizations seek more accountability for the funds they provide to public or private projects. This course serves as an introduction to assessment methodology and evaluation tools commonly used in program evaluation. Students will gain practical experience through a series of exercises involving the design of a conceptual framework, development of indicators, and development of an evaluation plan to measure impact, and cost benefit/cost effectiveness analysis. The course will cover mixed methods research including qualitative and quantitative analysis, methodologies, and/or paradigms in a research study. Students will evaluate a community health program funded by the Maryland Community Health Care Commission (CHRC), and the Commission director will guide selection of the program.
Additional Information: Students will travel to the program site approximately three times to guide the evaluation design and collect data.

HLSA778 Internship in Public Health (1-4 Credits)
Internship providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: Permission of SPHL-Health Services Administration department.
Repeatable to: 4 credits.
Credit Only Granted for: HLSA785 or HLSA778.

HLSA780 Qualitative Methods for Health Services Research (3 Credits)
Qualitative research is a multi-methods approach to the study of social interactions in natural settings. Through triangulation of methods, the researcher attempts to make sense of, or interpret, phenomema in terms of the meanings people bring to them.

HLSA785 Internship in Public Health (3 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: Permission of SPHL-Health Services Administration department.
Credit Only Granted for: HLSA785 or HLSA778.

HLSA786 Capstone Project in Public Health (3 Credits)
Capstone experience provding opportunity to apply knowledge and skills to a specific public health problem or issue. Completion of project relevant to public health under the direction of an advisor.
Prerequisite: Permission of SPHL-Health Services Administration department.

HLSA787 Minority Health and Health Equity (3 Credits)
A critical analysis of historical, political, economic, social, cultural, and environmental conditions that have produced an inequitable health status for racial and ethnic minorities in the United States.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA788 Critical Readings in Health Services Research (3 Credits)
Current and classic readings and research on various aspects of the health services research including the health care system, health care policy and social science research on health (including economics, psychology, political science, sociology etc.). The readings will be critically analyzed and applied to students research and current research as well as applications to health services research issues.
Repeatable to: 9 credits if content differs.

HLSA790 Advanced Methods in Health Services Research (3 Credits)
Provides an in-depth examination of health services research literature with emphasis on methodological scrutiny and application of methods beyond linear regression such as categorical regression, survival analysis, selection issues, and endogeniety.
Prerequisite: EPIB650 and EPIB651; or permission of instructor.

HLSA791 Advanced Research Seminar II (3 Credits)
Introduces pre-candidates at the end of their coursework to methods for locating, downloading and processing secondary data sources with complex survey design. The course emphasizes analysis of the Medical Expenditure Panel Survey (MEPS) data with Stata statistical software. The analysis and synthesis skills acquired throughout the students' doctoral coursework are applied to write and conduct analysis for a publishable journal article.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA792 Health Services Portfolio Seminar I (3 Credits)
Assists doctoral pre-candidates at the end of their coursework with completing the required research portfolio requirements.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA793 Health Services Portfolio Seminar II (3 Credits)
Introduces students to the main sections of a publishable paper. This is an applied course so students are expected to learn how to critique a research article and how to write a publishable one. By the end of this course, each student is expected to have written a publishable paper with a formal abstract, specific to their research topic.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA798 HLSA Journal Club (1 Credit)
The course will highlight current topics in health services research. Outside speakers will present their research in a few of the classes. For the other classes, graduate students in the HLSA programs will select important and timely articles that they will present to the class for discussion in an informal setting.
Restriction: Must be HLSA graduate student.
Repeatable to: 8 credits if content differs.

HLSA799 Master's Thesis Research (1-6 Credits)

HLSA898 Pre-Candidacy Research (1-8 Credits)

HLSA899 Doctoral Dissertation Research (1-8 Credits)

HLTH - Health

HLTH410 Honors Seminar (3 Credits)
Undergraduate majors with a strong academic record are provided the opportunity to engage in challenging educational experiences related to the social and behavioral aspects of public health. Students will learn the skills and knowledge to develop, propose, defend, and complete an honors thesis or honors project.
Prerequisite: HLTH200; and must have completed 2 other courses in HLTH.
Restriction: Minimum cumulative GPA of 3.5; and must have completed 45 credits before applying.

HLTH420 Effective Strategies for Public Health Practice (3 Credits)
The purpose of this course is to present the interrelationships of curriculum planning, methodology and the selection and use of successful public health presentation strategies. Special problems associated with public health presentations are discussed, and students become familiar with a variety of resources as well as with planning for and implementing demonstration presentations.
Prerequisite: Minimum grade of C- in HLTH301 and HLTH391.
Corequisite: HLTH490.

HLTH424 Lesbian, Gay, Bisexual & Transgender Health (3 Credits)
The preparation of students to be knowledgeable advocates for the health of lesbian, gay, bisexual, and transgender (LGBT) populations. Course focus is defined by the Healthy People 2020 federal health objectives for LGBT populations: data collection for research, culturally competent healthcare, bullying in schools, suicide, homelessness, and sexually transmitted diseases including HIV.
Recommended: Students should have some familiarity with basic psychology, sociology and/or epidemiology.
Restriction: This course is restricted to students who have completed a minimum of 60 credits. Also offered as: HLTH624.
Credit Only Granted for: HLTH424 or HLTH624.

HLTH430 Health Education in the Workplace (3 Credits)
A survey of the role of health education in work settings. Examination of occupational stress, the health effects of shift work, women's health in the workplace, health education approaches to informing workers and management, and health promotion programs in the workplace.

HLTH434 Introduction to Public Health Informatics (3 Credits)
Provides an overview of the field of public health informatics and the influence of technology on the public's health and well-being. Emphasizes the application of various technologies and computer/internet applications to support public health research and practice, including strategies to address new and emerging threats.
Restriction: Must be in one of the following programs (Community Health; Public Health Science) ; and must have earned a minimum of 60 credits.
Credit Only Granted for: HLTH434 or HLTH498E.
Formerly: HLTH498E.

HLTH460 Minority Health (3 Credits)
Health concerns of U.S. ethnic minority groups and factors placing them at elevated risk for disease and injury. Health education concepts and strategies to reduce disparities between their health status and the health status of the general population.
Prerequisite: HLTH140, HLTH230, or HLTH366; or permission of SPHL-Behavioral & Community Health department.
Restriction: Must be in a major within the SPHL-Behavioral & Community Health department.

HLTH471 Women's Health (3 Credits)
The historical, physiological, psychological, and sociological mechanisms which contribute to women's health. Topics will include gynecological concerns and reproductive health; nutrition, exercise; violence; substance use/abuse; and the health of special populations.
Restriction: Must be in a major within the SPHL-Behavioral & Community Health department; or must be in a major within the ARHU-Women's Studies department. Also offered as: WMST471.
Credit Only Granted for: HLTH471 or WMST471.

HLTH476 Death Education (3 Credits)
Examination of the genesis and development of present day death attitudes and behavior by use of a multidisciplinary life cycle approach.

HLTH489 Field Laboratory Projects and Workshop (1-6 Credits)
A course designed to meet the needs of persons in the field with respect to workshop and research projects in special areas of knowledge not covered by regularly structured courses.

HLTH490 Professional Preparation in Community Health (3 Credits)
The development of skills necessary for joining the public health work force post-graduation, as well as assistance in obtaining an appropriate internship that will serve as a final semester, capstone experience. Students will be exposed to various relevant professional experiences, and will be afforded the opportunity to strengthen their own individual skills by selecting from a menu of skills-based learning modules that best suit their perceived needs.
Prerequisite: Minimum grade of C- in HLTH391, BSCI170, BSCI171, and BSCI201.
Corequisite: HLTH420.
Restriction: Must be in Community Health program.

HLTH491 Community Health Internship (12 Credits)
Integrating theory with practice in a community health setting.
Prerequisite: Must have completed HLTH490 with a C- or higher.
Restriction: Must have completed all program requirements and be in the last semester of the Community Health degree program.

HLTH492 BS/MPH Community Internship (9 Credits)
Integrating theory with practice in a community health setting.
Prerequisite: Minimum grade of C- in HLTH490.
Restriction: Must be a Community Health major who has been admitted to the combined BS/MPH degree program.

HLTH498 Special Topics in Health (3 Credits)
Topics of special interest in areas not covered by regularly scheduled courses.
Repeatable to: 6 credits if content differs.

HLTH606 Foundations of Public Health Education and Policy (3 Credits)
Examines foundations and content of two professions, health education and public health, including history, mission, terminology, philosophy, ethical principles and scientific foundations. Emerging and reemerging threats to the public's health will be discussed, as well as societal influences on health and health policy. Also addresses professional competencies and preparation, and the role of professional organizations.
Restriction: Must be in MPH: Community Health Education (Master's) program; or must be in Ph.D.: Public and Community Health (Doctoral) program.

HLTH609 Public Health Journal Club (1 Credit)
Includes discussion of recent literature from leading peer-reviewed journals on a specific psychosocial construct and health outcome, with students presenting two articles during the semester. The purpose of this course is to read and consider health constructs and outcomes from a multidisciplinary perspective.
Restriction: Limited to Behavioral & Community Health doctoral and advanced MPH students; or permission of instructor.
Repeatable to: 4 credits.

HLTH624 Advanced Lesbian, Gay, Bisexual & Transgender Health (3 Credits)
The preparation of students to be knowledgeable advocates for the health of lesbian, gay, bisexual, and transgender (LGBT) populations. Course focus is defined by the Healthy People 2020 federal health objectives for LGBT populations: data collection for research, culturally competent healthcare, bullying in schools, suicide, homelessness, and sexually transmitted diseases including HIV.
Recommended: Students should have some familiarity with basic psychology, sociology and/or epidemiology.
Credit Only Granted for: HLTH424 or HLTH624.

HLTH625 Community Assessment through Qualitative Methods (3 Credits)
A discussion of major paradigms in qualitative inquiry, an overview of the process of qualitative research, and an introduction to several qualitative research methods, including grounded theory, ethnography, phenomenology, and content analysis. Students will collect, transcribe, analyze, and present qualitative data using introductory interview and analytic techniques.
Restriction: Course will be restricted to Behavioral and Community Health graduate students.

HLTH652 Quantitative Research Methods I in Public health (3 Credits)
Intermediate statistics and procedures in public health-related research for doctoral students. Focuses on applied statistics rather than theoretical, with emphasis on 1) how to apply statistical models, 2) how to perform the analysis with avialable software, and 3) how to interpret findings.
Restriction: Must be in MPH: Community Health Education (Master's) program; or must be in Ph.D.: Public and Community Health (Doctoral) program.
Credit Only Granted for: HLTH652 or HLTH688R.
Formerly: HLTH688R.

HLTH653 Quantitative Research Methods II in Public Health (3 Credits)
Intermediate and advanced statistics and procedures in health-related research for doctoral students with the focus on applications of these statistical methodological methods to public health research.
Prerequisite: HLTH652.
Restriction: Must be in a major within SPHL-Behavioral & Community Health department.
Credit Only Granted for: HLTH653 or HLTH688T.
Formerly: HLTH688T.

HLTH665 Health Behavior I (3 Credits)
The psychological, social psychological, and sociological theories of health behavior. The relation of health knowledge, beliefs, attitudes, intentions, and behavior to preventive, illness, sick-role, and health utilization behaviors.

HLTH666 Health Behavior II (3 Credits)
An advanced course with intensive training in health behavior research and the opportunity to carry out original research in health behavior. Patient-provider interaction, patient cooperation with medical treatment and other social and psychological influences on health care.
Prerequisite: HLTH665.

HLTH671 Public Health Communication (3 Credits)
An exploration of the the broad and diverse field of health communication including medical encounters, everyday communication about health, advertising, news, public health campaigns, community outreach, public policy, and international programs. Theories and applied efforts that have been studied and documented will be examined.
Restriction: Non-SPH students must obtain permission from the instructor prior to registering.
Credit Only Granted for: HLTH670 or HLTH671 and HLTH672.
Formerly: HLTH670.

HLTH672 Public Health Informatics (3 Credits)
A basic overview of Informatics and its application in a public health setting. The major goal is for students to understand the basic tools and building blocks needed to utilize this technology in order to improve their professional productivity
Restriction: Instructor permission is required for students not enrolled in a degree seeking program in the School of Public Health. Also offered as: EPIB672.
Credit Only Granted for: HLTH670 or HLTH671, HLTH672, EPIB 672.
Formerly: HLTH670.
Additional Information: Course hashtag - #umdphi12.

HLTH688 Special Problems in Health Education (1-6 Credits)

HLTH709 Public Health Research Journal Club (1 Credit)
Discussion of recent research literature from top peer-reviewed journals focusing on cutting edge research issues related to public health. Examines public health research issues and their relationship to the conduct and application of public health practice.
Restriction: Must be in Ph.D.: Public and Community Health (Doctoral) program; or must be an advanced MPH Behavioral and Community Health student; or permission of instructor.
Repeatable to: 4 credits.

HLTH710 Methods and Techniques of Research (3 Credits)

HLTH711 Advanced Research Methods in Health (3 Credits)
Quantitative techniques, advanced research methods and design issues.
Prerequisite: HLTH710.
Restriction: Must be in MPH: Community Health Education (Master's) program; or must be in Ph.D.: Public and Community Health (Doctoral) program.

HLTH712 Applied Research Methods in Behavioral and Community Health (3 Credits)
Designed to build on the research skills obtained in HLTH710 and other fundamental research methods and statistics courses. Methods and problems that are commonly encountered in health education research will be discussed including examination of actual research studies. Complex behavioral research issues will be addressed with existing research data sets. With these data sets, students will develop an analytic plan and conduct data analysis.
Prerequisite: HLTH710.

HLTH742 Professional Writing and Presentations (3 Credits)
Acquaints students with various types of professional writing required of public health professionals, including: grant proposals; journal articles; textbooks; presentation proposals and papers; and theses and dissertations. Includes both the form and content of technical documents as well as the processes of writing, peer review, and critique.
Restriction: Must be in MPH: Community Health Education (Master's) program; or must be in Ph.D.: Public and Community Health (Doctoral) program.
Credit Only Granted for: HLTH742 or HLTH688W.
Formerly: HLTH688W.

HLTH774 Community Health Program Planning (3 Credits)
An introduction to the development, planning, and administration of community health programs. The overall goal of this course is to develop a program and conceptualize the implementation of the intervention.
Restriction: Must be in a major within SPHL-Behavioral & Community Health department; or permission of instructor.
Credit Only Granted for: HLTH775 or HLTH774 and HLTH776.
Formerly: HLTH775.

HLTH775 Health Education Program Planning and Evaluation (3 Credits)
A systematic approach to the planning and evaluation of Health Education programs. Diagnosis of the social, psychological, educational and administrative aspects of the health education program. Program monitoring, rigorous methods of impact assessment, and the measurement of efficiency.
Prerequisite: HLTH710; and permission of SPHL-Behavioral & Community Health department.

HLTH776 Community Health Program Evaluation (3 Credits)
An application of basic research methods, and the evaluation of community health programs. Students will evaluate the effectiveness of a community health intervention.
Prerequisite: HLTH710 and HLTH774.
Restriction: Must be in a major within SPHL-Behavioral & Community Health department; or permission of instructor.
Credit Only Granted for: HLTH775 or HLTH774 and HLTH776.
Formerly: HLTH775.

HLTH778 Internship in Public Health (1-4 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: SPHL601, SPHL602, SPHL603, SPHL610, SPHL611, HLTH665, HLTH672, and HLTH710.
Repeatable to: 4 credits.
Credit Only Granted for: HLTH785 or HLTH778.

HLTH780 Community Health (3 Credits)
Overview of public health organizations, programs, and policies, including their structure and function, and their ability to change with changing community health needs.
Credit Only Granted for: HLTH740 or HLTH780.

HLTH785 Internship in Public Health (3 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: HLTH665, HLTH775, and HLTH780; or permission of SPHL-Behavioral & Community Health department.
Credit Only Granted for: HLTH785 or HLTH778.

HLTH786 Capstone Project in Public Health (3 Credits)
Capstone experience providing opportunity to apply knowledge and skills to a specific public health problem or issue. Completion of project relevant to public health under the direction of an advisor.
Prerequisite: Must have completed all required coursework; and permission of SPHL-Behavioral & Community Health department.
Restriction: Must be in a major within SPHL-Behavioral & Community Health department.

HLTH799 Master's Thesis Research (1-6 Credits)

HLTH898 Pre-Candidacy Research (1-8 Credits)

HLTH899 Doctoral Dissertation Research (1-8 Credits)

IMMR - Immigration Studies

IMMR400 Vital Voices: Oral Histories of the Immigrant Experience (3 Credits)
An exploration of the dynamic subject of U.S. immigrant experience through the scope of individual immigrant life stories in a global context. Course will include an overview of U.S. and global immigration patterns and an introduction to the practice of oral history.
Recommended: HIST222; or IMMR200.
Credit Only Granted for: HIST428N, IMMR400, THET428I, or THET498V..
Formerly: HIST428N.

IMMR419 Special Topics in Immigration and Migration Studies (3 Credits)
Thematic exploration of a topic in immigration or migration studies history with emphasis on understanding how the movement of people is relevant in the contemporary world.
Repeatable to: 6 credits if content differs.

INFM - Information Management

INFM600 Information Environments (3 Credits)
An exploration of various models and methodologies used to capture and deploy internal and external information and knowledge in a number of settings; organizational analysis in terms of information creation, flow, sharing, conservation, and application to problem solving; internal and external influences on the management of information and knowledge; various information flows; information management in a variety of settings.
Restriction: Permission of INFO-College of Information Studies.

INFM603 Information Technology and Organizational Context (3 Credits)
Application of communication and information technologies to support work processes, including technology-enhanced communication networks, computer-supported collaborative work, decision-support systems, interactive systems, and systems analysis. Acquisition of information systems and their integration into the organization.
Restriction: Must not have completed LBSC671 or LBSC690; and permission of INFO-College of Information Studies.

INFM605 Users and Use Context (3 Credits)
Use of information by individuals. Nature of information. Information behavior and mental models. Characteristics of problems, task analysis, problem solving, and decision making. Methods for determining information behavior and user needs. Information access. Information technology as a tool in information use.
Restriction: Permission of INFO-College of Information Studies.

INFM612 Management Concepts and Principles for Information Professionals (3 Credits)
Key aspects of management - focusing on planning, organizing, leading and controlling. The evolution of management, innovative management for the changing world, management styles and leadership, managerial planning, goal setting and decision making. Ethical issues, designing adaptive organizations responding to change, global environment, diversity, and utilizing the appropriate technology to provide effective management of information programs and services.
Restriction: Permission of INFO-College of Information Studies.

INFM620 Introduction to Strategic Information Management (3 Credits)
Strategic management is the comprehensive collection of tasks, activities, and processes organizations use to coordinate and align resources and actions with its mission, vision, and strategy. Due to changes occurring in our global landscape, the integration of business and technology is compelling organizations to move beyond traditional, reactive, and silo-based data management approaches to a managed, predictive approach that treats information as a strategic asset and uses it to create business value. To meet challenges of this hyper-competitive environment, this course will provide you with an introduction to the strategic management of information assets for competitive differentiation and sustained business success.
Prerequisite: INFM612; or LBSC631; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INFM700 Information Architecture (3 Credits)
Principles and techniques of information organization and architecture for the Web environment. Structured description of digital resources, including data modeling techniques, metadata schemes, and user-oriented navigation systems.
Prerequisite: INFM603; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INFM711 Financial Management of Information Projects (3 Credits)
Techniques and strategies of planning and executing successful projects. Project budgets, work breakdown structures and scheduling techniques, earned value, tracking and reporting project costs, risk management, best practices, and cost/benefit analysis.
Prerequisite: INFM600; and must have completed or be concurrently enrolled in INFM612. Or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INFM714 Principles of Competitive Intelligence (3 Credits)
Intelligence process and how to build business advantage by the collection and analysis of the capabilities, vulnerabilities, market positioning and strategic planning of competitors using open source information.
Prerequisite: INFM600; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM714 or INFM718W.
Formerly: INFM718W.

INFM718 Selected Topics in Information Management (1-3 Credits)
Selected topics in information management.
Repeatable to: 9 credits if content differs.

INFM719 Independent Study (1-3 Credits)
Intensive individual study under faculty supervision.
Restriction: Permission of instructor; and must be in Information Management (Master's) program; and permission of INFO-College of Information Studies.
Repeatable to: 6 credits if content differs.
Additional Information: Faculty permission and Independent Study Contract required.

INFM732 Information Audits and Environmental Scans (3 Credits)
Methods and techniques to monitor organizational environment to identify opportunities and threats and relate them to the strengths and weaknesses of the organization to fulfill organization information needs and their sustainability. Information audit to determine the existing information environment by assessing the information needs of the organization, determining the information currently available. Application of information audits and environmental scans in strategic information management.
Prerequisite: INFM600; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM730, INFM731, or INFM732.

INFM735 Internship in Information Management (3 Credits)
Introduction to information management issues in the workplace, including the knowledge, skills, and experience necessary for success in high-impact information management positions. Securing and facilitating mentor relationships, and the development of actionable professional development plans.
Prerequisite: INFM600, INFM603, INFM605, and INFM612; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INFM736 Information Management Experience (3 Credits)
The Information Management Capstone Experience I and II are the culminating experience of the Master of Information Management program, taken in the students final two semesters. The capstone experience provide students with the opportunity to integrate and synthesize the knowledge and skills acquired throughout their MIM course work while working in a real world Information Management project. These courses must be taken in succession.
Prerequisite: INFM600; and INFM612; and INFM605; and INFM603. Or permission of instructor.
Restriction: Must be in Information Management (Master's) program; and permission of INFO-College of Information Studies.

INFM737 Information Management Capstone Experience (3 Credits)
The Information Management Capstone Experience I and II are the culminating experience of the Master of Information Management program, taken in the students final two semesters. The capstone experience provide students with the opportunity to integrate and synthesize the knowledge and skills acquired throughout their MIM course work while working in a real world Information Management project. These courses must be taken in succession.
Prerequisite: INFM736; and must have earned a minimum of 27 credits in the MIM Program. Or permission of instructor.
Restriction: Must be in Information Management (Master's) program; and permission of INFO-College of Information Studies.

INFM747 Web-Enabled Databases (3 Credits)
Basic methods and tools for developing dynamic, database-driven web sites. Acquiring, installing, and running web servers, database servers, and connectability applications. Developing web interfaces and application-layer components.
Prerequisite: INFM603, LBSC690, or LBSC671; and INST733. Or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM747 or INFM718N.
Formerly: INFM718N.

INFM757 Organizational and Business Process Modeling (3 Credits)
General principles of modeling, including methods for modeling organizational and business process for information applications and strategy development. Approaches to evaluating models based on their accuracy and usefulness.
Prerequisite: Must have completed at least 9 credits in the College of Information Studies; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718V OR INFM757.
Formerly: INFM718V.

INFM799 Master's Thesis Research (1-6 Credits)
Intensive individual research course under the supervision of a faculty member.
Prerequisite: INST701; or permission of instructor.
Restriction: Must be in Information Management (Master's) program; and permission of instructor; and permission of INFO-College of Information Studies.
Repeatable to: 9 credits.

INST - Information Studies

INST408 Special Topics in Information Science (3 Credits)
Selected topics in information science.
Prerequisite: Must have completed INST201 OR INST301; or permission of instructor.
Restriction: Registration priority for students in BSIS program.
Repeatable to: 6 credits if content differs.

INST414 Data Science Techniques (3 Credits)
An exploration of how to extract insights from large-scale datasets. The course will cover the complete analytical funnel from data extraction and cleaning to data analysis and insights interpretation and visualization. The data analysis component will focus on techniques in both supervised and unsupervised learning to extract information from datasets. Topics will include clustering, classification, and regression techniques. Through homework assignments, a project, exams and in-class activities, students will practice working with these techniques and tools to extract relevant information from structured and unstructured data.
Prerequisite: INST314.
Restriction: Must be in Information Science program; and permission of INFO-College of Information Studies.

INST447 Data Sources and Manipulation (3 Credits)
Examines approaches to locating, acquiring, manipulating, and disseminating data. Imperfection, biases, and other problems in data are examined, and methods for identifying and correcting such problems are introduced. The course covers other topics such as automated collection of large data sets, and extracting, transforming, and reformatting a variety of data and file types.
Prerequisite: INST326 or CMSC131; and INST327.
Restriction: Permission of INFO-College of Information Studies; and must be in Information Science program.

INST448 Digital Curation Research in Cultural Big Data Collections (3 Credits)
Students will learn the principles, methods, and technologies involved in the digital curation of large cultural data collections. Students will learn these concepts in class lectures, discussions, and participating on project teams in the Digital Curation Innovation Center (DCIC).
Prerequisite: INST311.
Restriction: Must be in Information Science program.
Repeatable to: 6 credits if content differs.

INST462 Introduction to Data Visualization (3 Credits)
Exploration of the theories, methods, and techniques of visualization of information, including the effects of human perception, the aesthetics of information design, the mechanics of visual display, and the semiotics of iconography.
Prerequisite: INST314.
Restriction: Must be in Information Science program; and permission of INFO-College of Information Studies.

INST465 Design and Human Disability and Aging (3 Credits)
Design of special and mainstream products and systems to include use by people facing barriers to use due to disability and aging. Includes introduction to people with disabilities and the tools they use and strategies for cross-disability inclusive design of special and mainstream technology.The class will then be divided into interdisciplinary design teams. These teams will be given a special or mass market product for which they are to develop a design which is more accessible, yet remains mass producible and marketable. Emphasis will be on practical mass-market design and the realities and constraints of design for commercial production and/or public systems.
Credit Only Granted for: INST408B or INST465.
Formerly: INST408B.

INST466 Technology, Culture, and Society (3 Credits)
Individual, cultural, and societal outcomes associated with development of information & communication technologies (ICTs), including pro- and anti-social factors. Unpacking how gender, race, ethnicity, sexual orientation, disabilities, and political affiliations affect consumption and production of online experiences. Unpacking how structures of dominance, power and privilege manifest at individual, institutional and cultural levels.
Prerequisite: INST201.
Restriction: Must be in Information Science program; or permission of INFO-College of Information Studies.

INST490 Integrated Capstone for Information Science (3 Credits)
The capstone provides a platform for Information Science students where they can apply a subset of the concepts, methods, and tools they learn as part of the Information Science program to addressing an information problem or fulfilling an information need.
Prerequisite: Minimum grade of C- in INST314, INST335, INST346, INST352, and INST362.
Restriction: Must be in Information Science program; and must have completed all Information Science major core courses; and permission of INFO-College of Information Studies.

INST603 Systems Analysis and Design (3 Credits)
Formal process for planning and designing an information technology system, including identifying users and other stakeholders, analyzing work processes, preparing system specifications, conducting feasibility and usability studies, and preparing for implementation. Approaches to analyzing system components and functions. Measurement and evaluation of system performance.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST603, LBSC603, or INFM613.
Formerly: INFM613

INST604 Introduction to Archives and Digital Curation (3 Credits)
Overview of the principles, practices, and applications in the archival and digital curation fields.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC604 or LBSC605.

INST607 Government Information (3 Credits)
An introduction to the nature and scope of government information. Tracing the ongoing efforts of government agencies to offer information, services, and resources online, this course examines the nature, current impacts, and future impacts of E-government. More specifically, the course explores information and communication technologies designed to make government more open and transparent; the design, implementation, and evaluation of efficient, effective, and new government and governance mechanisms; the role of information institutions in supporting E-government; and the development and implementation of selected public facing E-government tools (e.g., portals, visualizations).
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718E, INST607, or LBSC708E.
Formerly: INFM718E and LBSC708E.

INST610 Information Ethics (3 Credits)
Investigation of the diverse range of ethical challenges facing society in the information age. Ethical theories, including non-Western and feminist theories. Application of theories to information ethics issues.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718Q, INST610, or LBSC708I.
Formerly: INFM718Q and LBSC708I.

INST611 Privacy and Security in a Networked World (3 Credits)
Evolving conceptualization of privacy and security issues in light of technological developments in the 21st century. Analysis of legal, ethical, design, and socially constructed challenges that organizations and individuals face when developing privacy and security solutions.
Restriction: Permission of INFO-College of Information Studies.

INST612 Information Policy (3 Credits)
Nature, structure, development and application of information policy. Interactions of social objectives, stakeholders, technology and other forces that shape policy decisions.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST612 or LBSC625.
Formerly: LBSC625.

INST613 Information and Human Rights (3 Credits)
An examination of information as a human right, including topics: social, cultural, economic, legal, and political forces shaping information rights; the impact of information rights on information professions, standards, and cultural institutions; and information rights and disadvantaged populations.
Restriction: Permission of INFO-College of Information Studies.

INST614 Literacy and Inclusion (3 Credits)
The educational and psychological dimensions of helping and supporting new users to become information literate and experienced users to remain engaged.
Restriction: Permission of INFO-College of Information Studies.

INST615 Information Professionals and the Law (3 Credits)
An exploration of the interrelated issues of the provision of and information literacy about legal information by information organizations and the impacts of legal issues, such as privacy and filtering, on the practice of information organizations that serve the public.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC735 OR INST615.
Formerly: LBSC735.

INST616 Open Source Intelligence (3 Credits)
An introduction to Open Source Intelligence (OSINT) for Information Professionals. For the purposes of this course, OSINT will be defined as the use of free, publicly available online sources that can be used to gather information that may be later used to conduct analysis or reach conclusions. Students will learn basic and advanced techniques for using search engines, people directories, social media networks, location-based services, images and videos, public records, and other sources. The course will also offer students more technical aspects of open-source information, including domains, IP addresses, and the deep web. Throughout the modules, data quality and validation procedures will be key topics.
Restriction: Permission of INFO-College of Information Studies.

INST620 Diverse Populations, Inclusion, and Information (3 Credits)
Importance of equality of information access. Social, political, and technological barriers to information. Information needs of diverse and underrepresented populations. Principles of inclusive information services.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC620 OR INST620.
Formerly: LBSC620.

INST621 Managing Digital Innovations in Organizations (3 Credits)
Students will learn the main theoretical perspectives on managing digital innovations, become familiar with current best practices of innovating with IT, and develop innovation skills in various organizational settings such as project teams, functional departments, organizations, communities, and society at large.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718Z or INST621.
Formerly: INFM 718Z.

INST622 Information and Universal Usability (3 Credits)
Information services and technologies to provide equal experiences and outcomes to all users. Laws, standards, approaches, component concepts, access needs, and technologies in relation to physical and online information environments.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC622 OR INST622.
Formerly: LBSC622.

INST627 Data Analytics for Information Professionals (3 Credits)
Skills and knowledge needed to craft datasets, perform quantitative and qualitative analyses, and develop information resources that bridge the gap between raw data and decision makers' needs.
Restriction: Permission of INFO-College of Information Studies.

INST630 Introduction to Programming for the Information Professional (3 Credits)
An introduction to computer programming intended for students with no previous programming experience. Topics include fundamentals of programming and current trends in user interface implementation that are relevant to information professionals.
Restriction: Permission of INFO-College of Information Studies.

INST632 Human-Computer Interaction Design Methods (3 Credits)
Methods of user-centered design, including task analysis, low-tech prototyping, user interviews, usability testing, participatory design, and focus groups.
Prerequisite: LBSC671, INFM603, or INST631; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST633 Analyzing Social Networks and Social Media (3 Credits)
Introduces students to the science and social science of network analysis. Through real world examples, including analysis of their own social networks, students will develop skills for describing and understanding the patterns and usage of services like Facebook, Twitter, YouTube, and others. Students will read classic and cutting edge articles and books about these topics and discuss their applicability to this new social media. The class will culminate with a capstone project in which students will apply the analysis methods they have learned to understanding a particular question about social networks and social media.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC708L or INST633.
Formerly: LBSC708L.

INST638 HCI Professional Preparation Seminar (1 Credit)
The human-computer interaction area is huge and diverse, yet all HCI professionals will face a common set of challenges upon embarking into their future careers, including job hunting, interviewing, joining a team, managing group dynamics, and staying abreast of current technology. Students will learn how to tackle these challenges from a series of speakers familiar with current industry practice.
Repeatable to: 3 credits if content differs.

INST639 Practical Skills in HCI (1 Credit)
Current industry practice in the HCI and UX field involves being familiar with many practical skills and specialized software. In this repeatable course, HCIM students will be able to acquire some of these vital practical skills in order to be better prepared for joining industry upon graduation. Furthermore, this will also be an opportunity for students to develop their portfolio for future job hunts. Offered in both Fall and Spring semesters, the intention is for these "practical skills" to be taught by professional instructors with expert knowledge. The content of the course will vary from semester to semester, but here is a sample of topics: Graphic and visual design and communication; UX design and research in games; Voice and gestures; UX mockups and wireframing tools; Practical web design and technologies; UX project management software.
Repeatable to: 3 credits if content differs.

INST640 Principles of Digital Curation (3 Credits)
Principles for the design and implementation of long-term curation of digital data and information assets, including born-digital and digitized assets. Frameworks for analysis of technical, practical, economic, legal, social and political factors affecting digital curation decisions. Case studies of specific digital curation scenarios.
Restriction: Permission of INFO-College of Information Studies.

INST641 Policy and Ethics in Digital Curation (3 Credits)
Discussion of strategies to address intellectual property, privacy, security and other policy and ethics concerns raised by the curation of digital records and data.
Prerequisite: INST604; or INST640; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST643 Curation in Cultural Institutions (3 Credits)
An overview of the principles, practices, and current debates in the management, care and representation of digital artifacts in libraries, archives, and museums.
Restriction: Permission of INFO-College of Information Studies.

INST644 Introduction to Digital Humanities (3 Credits)
A survey of the history, methods, and principal topics of the Digital Humanities, examined from theoretical and applied perspectives.
Restriction: Permission of INFO-College of Information Studies.

INST645 Personal Digital Curation (3 Credits)
Discussion and workshop in selecting and preserving digital personal data and records.
Restriction: Permission of INFO-College of Information Studies.

INST646 Principles of Records and Information Management (3 Credits)
Principles and practices of managing records in the context of information management programs in government, corporate and other institutional settings. Includes access; legal requirements; digital technologies; and creation, administration, appraisal, and retention and disposition of records.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC680 OR INST646.
Formerly: LBSC680.

INST647 Management of Electronic Records & Information (3 Credits)
Focuses on the life cycle of records and the impact of technology programs for managing electronic records. Explores the roles of records managers in the management of electronic records.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC682 OR INST647.
Formerly: LBSC682.

INST650 Facilitating Youth Learning in Formal and Informal Environments (3 Credits)
The historical, organizational, and contemporary contexts of formal and informal learning spaces; the principles of teaching, learning, and information literacy that underlie the formal and informal learning spaces; and the leadership role that information professionals can play within their schools, libraries and communities.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST650 or LBSC640.
Formerly: LBSC640.

INST651 Promoting Rich Learning with Technology (3 Credits)
Exploration of how technology can be used to promote rich learning experiences, with a particular focus on youth populations. Assessment of the how, when, and why of infusing technology into the teaching and learning process.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST651 or LBSC642.
Formerly: LBSC642.

INST652 Design Thinking and Youth (3 Credits)
Methods of design thinking specifically within and for youth contexts, including user-centered design, understanding user needs, ideation, contextual design, participatory design, iterative prototyping, and visual design. These topics will specifically be studied in the context of designing with and for youth.
Restriction: Permission of INFO-College of Information Studies.

INST660 Strategic Leadership (3 Credits)
Students will use research and best practices to act and think like a leader, increase your self-awareness, and learn how to unlock potential in others. From the stories of great leaders and everyday people, you will learn and practice empowerment, accountability, courage, creativity, and humility, which are the key leadership skills. In addition, this course will teach you how to create new opportunities and lasting impact to drive growth and value creation in your organization.
Prerequisite: INFM612; or LBSC631; or LBSC635; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST660, LBSC708F or INFM718F.
Formerly: LBSC708F, INFM718F.

INST670 Introduction to Javascript Programming (1 Credit)
Introduction to the fundamentals of Javascript programming. Basic components of all programming languages, including variables, types, data structures, and control flow, with a focus on leveraging Javascript libraries for more advanced functionality. No prior experience needed.
Credit Only Granted for: INST728N and INST670.
Formerly: INST728N.

INST671 Introduction to Web Programming (1 Credit)
Introduction to the fundamentals of designing and programming web sites. HTML programming extended by work with Cascading Style Sheets. Programming skills are complemented with fundamentals of design and usability. No prior programming experience needed.
Credit Only Granted for: INST728W or INST671.
Formerly: INST728W.

INST673 Hands On Machine Learning with Weka (1 Credit)
Students will receive hands on experience with the open-source machine learning tool Weka. Topics covered will be classification, regression, basic algorithm types, how to get data into a format Weka can process, how to interpret results, and basic document classification. The class will meet online.
Recommended: It is recommended that students have some familiarity with programming prior to taking this course.
Restriction: Permission of INFO-College of Information Studies.

INST680 Health Informatics (3 Credits)
An introduction to the ways in which medical data, information, and knowledge are created, stored and used. Students will gain an understanding of the current trends in the delivery of medical care and the ways in which these trends influence health information resources and systems.
Prerequisite: Must have completed or be concurrently enrolled in INFM600 or LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST680 or INST728F.
Formerly: INST728F.

INST681 Health Information Behavior (3 Credits)
Exploration of information needs of healthcare professionals and the general public, as well as how they seek information to fulfill these information needs, impacts and outcomes of health-related information-seeking by multiple populations. Examination of models and theories and empirical studies of patient and healthcare professional information behavior.
Prerequisite: INFM600; or LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST682 Personal Health Informatics & Visualization (3 Credits)
Personal Health Informatics cover a broad concept that encompasses an array of approaches to collect, store, share, analyze, and reflect on personal health data. Not only health care providers are relying on Health Technologies to improve patient care, people are increasingly using health devices and apps in their everyday life. Individuals have started using new technologies to collect data, increase awareness, and reflect on and change their behaviors. They also use various tools for curiosity and fun. This course will provide an overview of this exciting field and examine how social and behavioral theories can be applied to create effective health applications.It is difficult to create health technologies that can successfully be integrated into people's daily life due to many obstacles in individuals' data collection, integration, self-reflection, and sharing practices. Understanding these challenges is an important part of designing Health Technologies. Therefore, this course will cover HCI and design thinking methods that you can leverage in understanding the adoption of Health Technologies. Moreover, visualizations facilitate people to gain insights from their data, so we will cover common visualization approaches used in the personal data contexts.

INST701 Introduction to Research Methods (3 Credits)
Techniques and strategies of research as applied to the definition, investigation, and evaluation of information problems. Qualitative, quantitative, and mixed methods of research design methods are considered from the aspects of implementation, analysis, and interpretation.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC701, INFM718M or INST701.
Formerly: LBSC701, INFM718M.

INST702 Advanced Usability Testing (3 Credits)
Usability testing methods -- how to design and implement them both for desktop and mobile sites. Students will learn the complex process of facilitating usability testing and how to synthesize test data into a report.
Prerequisite: Permission of instructor; or (INFM605 or INST631).
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM702 or INST702.
Formerly: INFM702.

INST704 Inclusive Design in HCI (3 Credits)
An introduction to inclusive technology design, that is, the design and evaluation of user interfaces for diverse users and use contexts. Building on basic concepts in human-computer interaction, students will learn about design exclusion and barriers to use, and methods by which these can be overcome. Assistive input and output technologies will also be covered. Populations include older adults, users with visual, cognitive or motor impairments, users who are deaf or hard of hearing, children, users in low resource contexts, and users in mobile contexts. Research trends and practical design considerations (e.g., web accessibility requirements) will be covered. Students will interact with the material through readings, discussion, and individual and group assignments.
Prerequisite: INST631; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST728Z OR INST704.
Formerly: INST728Z.

INST706 Project Management (3 Credits)
Comprehensive overview of project management, focusing on the needs of information resource (IR) projects. Concepts and techniques for planning and execution of projects including developing work breakdown structure, estimating costs, managing risks, scheduling, staff and resource allocation, team building, communication, monitoring, control, and other aspects of successful project completion.
Prerequisite: INFM603 and INFM612; or (LBSC631 and LBSC671); or (LBSC635 and LBSC670); or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST706 or INFM706.
Formerly: INFM706.

INST709 Independent Study (1-3 Credits)
Intensive individual study, reading, or research in an area of specialized interest under faculty supervision. Registration limited to the advanced student with the approval of the advisor and of the faculty member involved.
Prerequisite: Completion of all core courses.
Restriction: Permission of INFO-College of Information Studies; and permission of instructor.
Repeatable to: 9 credits.
Additional Information: A student may complete no more than 9 credits registered under 709 or a total of 12 credits registered under 708 and 709.

INST710 User Experience Research Methods (3 Credits)
Students will learn to conduct user research in industry and to provide foundational knowledge needed for academic research. It examines the theoretical and epistemological differences between research paradigms and provides an overview of qualitative, quantitative and mixed-method approaches. It overviews user-centered design (UCD) methods, and uses Contextual Inquiry/Contextual Design as the backbone for a research project, incorporating related formative UCD methods and techniques. It is a project-based course, where students conduct a semester-long project to prepare them for the HCIM Capstone as well as other types of formative user research.

INST714 Information for Decision-Making (3 Credits)
The use of information in organizational and individual decision-making. An examination of managers' behavior in using information; differences between the private and public sectors; and the roles of information professionals and information systems in decision-making.
Prerequisite: LBSC631 or INFM612; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718A, INST714 or LBSC705.
Formerly: INFM718A and LBSC705.

INST715 Knowledge Management (3 Credits)
Nature, creation, acquisition, and use of knowledge. Strategic role of knowledge in organizations and institutions. Information and knowledge ecology. Structure and functions of knowledge management systems and the role of the Internet and intranets. Knowledge as intellectual capital. Roles of librarians and information professionals in the knowledge economy. Strategic issues and future trends.
Prerequisite: INFM600 or LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST715 or LBSC715.
Formerly: LBSC715.

INST716 Information, Technology, and Society (3 Credits)
An exploration of the mutually constitutive relationship between information technology (IT) and society, including how IT transforms society and how society transforms IT.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST716, LBSC708T, or INFM718T.
Formerly: LBSC708T and INFM718T.

INST717 Internship Practicum in Human-Computer Interactions (3 Credits)
Required, supervised experience working in an industry, government, non-profit organization or an educational institution to address a problem in Human-Computer Interaction. Students will spend a minimum of 120 hours working in the agency during the internship.
Prerequisite: INST631 and INST632.
Recommended: INST701.
Restriction: Permission of INFO-College of Information Studies; and must be in Human-Computer Interaction (Master's) program.

INST725 Legal Research for Information Professionals (3 Credits)
An in-depth exploration the methods, resources, and context of conducting advanced legal research. After offering an overview of various types of legal materials, the course will focus on finding and analyzing legal materials through various primary sources, databases, secondary sources, and public records for government and corporate settings. The course will also discuss practical issues of conducting legal research, such as data management and budgeting.
Prerequisite: INST615.
Restriction: Permission of INFO-College of Information Studies.

INST728 Special Topics in Information Studies (1-3 Credits)
Selected topics in information studies.
Restriction: Permission of INFO-College of Information Studies.
Repeatable to: 9 credits if content differs.

INST729 International Opportunities in Information Studies (3 Credits)
Short term, experiential course offered in conjuction with the University's Study Abroad Office, to volunteer, complete a project, or conduct research in a library or information organization outside the U.S. Focus and location varies.
Prerequisite: Permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Formerly: LBSC708S and LBSC729.

INST733 Database Design (3 Credits)
Principles of user-oriented database design. Requirements analysis. Data modelling. Data integrity and security and multi-user databases. Implementing an information system using a database management system (DBMS).
Prerequisite: LBSC690, LBSC671, or INFM603; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST733 or LBSC793.
Formerly: LBSC793.

INST734 Information Retrieval Systems (3 Credits)
Principles of organizing and providing access to information using automated information storage and retrieval systems. Retrieval systems models, index language selection, data structure, user interfaces, and evaluation for text and multimedia applications.
Prerequisite: LBSC671 or INFM603; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST734 or LBSC796.
Formerly: LBSC796.

INST735 Computational Linguistics I (3 Credits)
Fundamental methods in natural language processing. Topics include: finite-state methods, context-free and extended context-free models of syntax; parsing and semantics interpretation; n-gram and Hidden Markov models, part-of-speech tagging; natural language applications such as machine translation, automatic summarization, and question answering.
Prerequisite: CMSC421; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of INFO-College of Information Studies. Also offered as: CMSC723, LING723.
Credit Only Granted for: CMSC723, LING723, or INST735.

INST736 Computational Linguistics II (3 Credits)
Natural language processing with a focus on corpus-based statistical techniques. Topics include: stochastic language modeling, smoothing, noisy channel models, probabilistic grammars and parsing; lexical acquisition, similarity-based methods, word sense disambiguation, statistical methods in NLP applications; system evaluation.
Prerequisite: LING723 or CMSC723; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies. Also offered as: CMSC773, LING773.
Credit Only Granted for: INST736, INST728C, CMSC773, LING773, or LBSC774.

INST737 Introduction to Data Science (3 Credits)
An exploration of some of the best and most general approaches to get the most information out of data through clustering, classification, and regression techniques.
Prerequisite: INST627; and (LBSC690, LBSC671, or INFM603). Or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST741 Social Computing Technologies and Applications (3 Credits)
Tools and techniques for developing and configuring social computing applications. Theories and paradigms for social computing. Strengths and limitations of different application styles and types. Evolution of applications as responses to social computing challenges. Information and organizational systems co-development.
Prerequisite: INFM603 and INFM605; or (LBSC602 and LBSC671); or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM741 or INST741.
Formerly: INFM741.

INST742 Implementing Digital Curation (3 Credits)
Management of and technology for application of digital curation principles in specific settings. Characteristics, representation, conversion, and preservation of digital objects. Application of standards for digitization, description, and preservation. Planning for sustainability, risk mitigation and disaster recovery.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST744 Solving Problems in Digital Curation - Capstone Course (3 Credits)
Project-based course that applies digital curation principles and techniques first-hand in an institutional program setting. The focus is on a well-defined project that constitutes a learning experience and also permits the student to contribute to the ongoing work of the host institution. The project must address one or more aspects of digital curation: design and implementation for long-term digital curation of a discrete collection; application of technologies and standards for digitization, description, and preservation of digital assets; or implementation of strategies to provide access to a digital collection.
Restriction: Must be enrolled in the Curation and Management of Digital Assets (CMDA) Certificate.

INST745 Introduction to Digital Arts Curation (3 Credits)
Representation and curation of art artifacts through digital media, with a focus on how to collect and manage born-digital artifacts, digitized artifacts, and their related data and metadata.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST746 Digitization of Legacy Holdings (3 Credits)
Through hands on exercises and real-world projects, students will learn how to incorporate digitization of analog holdings into an existing archival program and how to link records of different formats and from different collections together.
Prerequisite: INST604.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST728B or INST746.
Formerly: INST728B.

INST747 Research in Advanced Digital Curation (3 Credits)
Students will build their ability to understand the complexity of research strategies and apply tools involved in the management and use of digital information in the Age of Big Data. The class will contain class lectures, class discussions, assigned readings, and extensive hands-on experience with student experience in digital curation projects. The research projects are focused around six major themes that will engage students in multiple arenas of research in Big Data. These are: community displacement, refugee narratives, movement of people, citizen internment, racial zoning, and cyberinfrastructure for digital curation. Project participants will have the opportunity to work with external stakeholders.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST728L or INST747.
Formerly: INST728L.

INST750 Advanced Data Science (3 Credits)
Application of data science techniques to unstructured, real-world datasets including social media and geo-referenced sources. Techniques and approaches to extract information relevant for experts and non-experts in areas that include smart cities, public health, and disaster management.
Prerequisite: INFM603 and INST737; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM750 OR INST750.
Formerly: INFM750.

INST760 Data Visualization (3 Credits)
Introduction to the science and technology of data visualization--the graphical representation of data to aid understanding--and includes both theoretical foundations as well as practical applications of integrated visualization techniques on real-world problems. Application of these techniques to state-of-the-art problem domains within research, society, and industry.
Prerequisite: INST630; or INFM603; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST760 or INST728V.
Formerly: INST728V.

INST762 Visual Analytics (3 Credits)
Visual analytics is the use of interactive visual interfaces to facilitate analytical reasoning. In essence, visual analytics is based on the--not uncontroversial--idea that humans and computers working alone are insufficient for the data challenges of today and tomorrow, and that effective synthesis of both humans and computational algorithms are needed to create human-in-the-loop systems. Thus, visual analytics bridges human-centered disciplines such as visualization and human-computer interaction with computation-centered disciplines such as machine learning, probabilistic methods, and knowledge discovery. The course contents will include both theoretical foundations of this interdisciplinary science as well as practical applications of integrated visual analysis techniques on real-world problems.
Prerequisite: INFM603 or INST630; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST728Q OR INST762.
Formerly: INST728Q.

INST765 Programming on the Web (3 Credits)
Non-programmers will learn basic programming and how to develop familiarity with web formatting and programming paradigms, including XML, REST, APIs, and authentication schemes. The class begins with an introduction to basic programming and students build on those skills by programming applications that use web-based data and services.
Prerequisite: INFM603, LBSC690, LBSC671, or INST733; or permission of instructor.
Credit Only Granted for: INFM743 or INST765.
Formerly: INFM743.

INST767 Big Data Infrastructure (3 Credits)
Principles and techniques of data science and business intelligence. Technologies and architectures for large-scale data warehousing and scale-out data analytics platforms. Supervised and unsupervised data mining.
Prerequisite: INST737; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST775 HCIM CAPSTONE PREP (3 Credits)
Students will define a project, which requires a high level of background research, rigor in execution and evaluation, and documentation. Capstone projects may follow the design, prototyping and evaluation process from end-to-end or may focus on a subset of elements in that process, such as formative study and design.
Prerequisite: INST631, INST632, and INST717; and must have completed Research Methods; and permission of INFO-College of Information Studies. Or permission of instructor.
Restriction: Must be taken in the fall semester of the year in which the student plans to graduate; and permission of INFO-College of Information Studies.

INST776 HCIM CAPSTONE PROJECT (3 Credits)
The opportunity to apply the skills learned through coursework in a semester-long project applied to a real -world problem. Capstone projects may follow the design, prototyping and evaluation process from end-to-end or may focus on a subset of elements in that process, such as formative study and design.
Prerequisite: INST775; or permission of instructor.
Restriction: Must be taken in the semester immediately following completion of INST775 HCIM Capstone Prep; and permission of INFO-College of Information Studies.

INST779 Readings Seminar (1 Credit)
Readings in emerging topics. Through readings and discussion the class will critically assess future directions and highlight intersection points with other disciplines (e.g., medicine) and sub-disciplines of information studies and computer science (e.g., information retrieval, computer vision, machine learning). One or more themes will be covered over the semester (e.g., inclusive design, health informatics, environmental sustainability, social networking) and will be chosen based on instructor and student interest.
Restriction: Permission of INFO-College of Information Studies.
Repeatable to: 3 credits if content differs.
Credit Only Granted for: INST779, INST728J.
Formerly: INST728J.

INST782 Arrangement, Description, and Access for Archives (3 Credits)
Introduction to the key concepts and practices involved with arrangement and description of archives, and the techniques appropriate to enable users to access archival information in traditional and nontraditional archival contexts.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC684, LBSC781, LBSC782, or INST782.
Formerly: LBSC684, LBSC781, and LBSC782.

INST784 Digital Preservation (3 Credits)
Issues and practices regarding digitization of analog materials and preservation of digital materials, both digitized and born digital.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC784 or INST784.
Formerly: LBSC784.

INST785 Documentation, Collection, and Appraisal of Records (3 Credits)
Development of documentation strategies and plans; collecting policies to guide programs in acquiring records; theories and techniques for appraising records to identify those with continuing value.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC785 OR INST785.
Formerly: LBSC785.

INST794 Capstone in Youth Experience (3 Credits)
Through a supervised project, to synthesize design thinking, participatory design, connected learning, and learning theory/frameworks students will produce a technology-infused program for and with youth. Students will develop and carry out a project with a community partner through their library system. The project must incorporate technology and design thinking, and must be based on one or more learning theory/frameworks. Through the course, students will learn many practical skills related to planning and implementation of a technology-infused programming at or through their library, including marketing, fundraising, budgeting, legal issues, logistical issues, developing and sustaining community partnerships, developing engaging experiences for youth, and creating and analyzing learning assessments.
Prerequisite: INST650, INST651, and INST652; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies; and must be part of Youth Experience (YX) certificate program.

INST799 Master's Thesis Research (1-6 Credits)

INST800 The Engaged Intellectual: An Introduction to Research and Academic Work (3 Credits)
An introduction to the academic life with a particular focus on what it means to undertake research, teaching, and service.
Restriction: Permission of INFO-College of Information Studies; and restricted to students in Ph.D. in Information Studies (INFS) program.

INST808 Seminar in Research Methods and Data Analysis (3 Credits)
Topics and issues in information studies research. Design and conduct of research project.
Restriction: Permission of INFO-College of Information Studies. And must be in Information Studies (Doctoral) program; or permission of instructor.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: INST808, LBSC802, or INST802.
Formerly: LBSC802, INST802.

INST809 Individualized Teaching Experience (3-5 Credits)
Introduction to the techniques and challenges associated with design, delivery, and evaluation of couses offered at the University level. The doctoral student will work one-on-one with a faculty member in the development and co-teaching of a graduate level course.
Prerequisite: Must have completed 18 credit hours of doctoral course work.
Restriction: Permission of INFO-College of Information Studies; and permission of instructor.
Repeatable to: 6 credits.
Credit Only Granted for: INST809, LBSC774, INST728G.
Formerly: INST728G.

INST810 Individual Research Experience (3 Credits)
Pre-candidacy individual research experience directed by a faculty member.
Credit Only Granted for: INST810 or LBSC810.
Formerly: LBSC810.

INST878 Special Topics in Information Studies (3 Credits)
Seminar topics offered as faculty and student interests warrant. Topic varies.
Restriction: Permission of INFO-College of Information Studies. And must be in Information Studies (Doctoral) program; or permission of instructor.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: INST878 or LBSC878.
Formerly: LBSC878.

INST888 Doctoral Seminar (3 Credits)
Advanced seminar on selected topics in information studies.
Restriction: Must be in Information Studies (Doctoral) program; and permission of INFO-College of Information Studies.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: INST888 or LBSC888.
Formerly: LBSC888.

INST898 Pre-Candidacy Research (1-8 Credits)

INST899 Doctoral Dissertation Research (1-8 Credits)

ISRL - Israel Studies

ISRL448 Seminar in Israel Studies (3 Credits)
Intensive study of an Israel Studies topic. Expected work product is a substantial research or analysis paper or appropriate equivalent.
Recommended: ISRL349 and ISRL249.
Restriction: Must be in the Israel Studies Minor.

ISRL449 Advanced Topics in Israel Studies (3 Credits)
Topics in the study of Zionism and contemporary Israel from the 1880s to the present at the advanced level. Individual sections may address history, politics, or culture. Some Sections may have language or course prerequisites.
Recommended: ISRL349 or ISRL249.
Repeatable to: 6 credits if content differs.

ISRL499 Advanced Independent Study in Israel Studies (1-3 Credits)
This upper-level independent study allows students to work closely with an Israel Studies faculty member of their choice, pending prior approval of the faculty member. In this independent study, students will focus on a topic specific to Israel Studies.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 6 credits.

ISRL618 Graduate Seminar in Israel Studies (3 Credits)
An exploration of aspects of the history, politics, society, or culture of Modern Israel. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL628 Special Topics in Israeli History (3 Credits)
An exploration of aspects of the history of Modern Israel. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL638 Special Topics in Israeli Politics (3 Credits)
An exploration of aspects of Israeli politics. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL648 Special Topics in Israeli Society (3 Credits)
An exploration of aspects of Israeli society. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL658 Special Topics in Israeli Culture (3 Credits)
An exploration of aspects of Israeli culture. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL699 Independent Study in Israel Studies (3 Credits)
This graduate-level independent study allows graduate students to work closely with an Israel Studies faculty member of their choice, pending prior approval of the faculty member. In this independent study, graduate students will focus on a topic specific to Israel Studies.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ITAL - Italian

ITAL401 Advanced Composition and Style (3 Credits)
Advanced writing practice in range of genres.
Prerequisite: ITAL301; or students who have taken courses with comparable content may contact the department.

ITAL411 Monsters and Demons: the Faces of Evil in Dante's Inferno (3 Credits)
An interdisciplinary study of Dante's Inferno as represented in the Divine Comedy. Special emphasis on Dante's own portrayal of monsters and demons and their roles in the poet's eschatological vision of Hell.Taught in English

ITAL421 The Italian Renaissance (3 Credits)
A study of major trends of thought in Renaissance literature, art, and science. Taught in English.
Credit Only Granted for: ITAL421 or ITAL422.

ITAL431 Italian Civilization in Translation (3 Credits)
Political, social, intellectual, literary and artistic forces shaping contemporary Italy from the late Middle Ages to the present. Taught in English.
Credit Only Granted for: ITAL431 or ITAL432.

ITAL433 Holocaust in Italian Literature and Cinema (3 Credits)
Review of literature and theoretical writings of Italy's most famous survivor, Primo Levi, to a sampling of Italian films that focus in vastly different and often extremely controversial ways on the experience of the concentration camp, while addressing a series of central questions from the brutal realities of the camps to the "compromises" made in order to survive, the need to bear witness, and the idea of the survivor's guilt.Also offered as: FILM433.
Credit Only Granted for: ITAL433 or FILM433 or (JWST419R in Fall 2008).
Formerly: JWST419R in Fall 2008.

ITAL436 Italian Cinema I: Neorealism (3 Credits)
Explores representations of Italy in cinema with special focus on identity formation and the movement of Italian neorealism and post neorealism. Taught in English.Also offered as: FILM441.
Credit Only Granted for: FILM441 or ITAL436.

ITAL469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ITAL471 Italian Cinema: A Cultural Approach in Translation (3 Credits)
The culture of Italy through the medium of film from the silent days up to the present. Taught in English.
Credit Only Granted for: ITAL471 or ITAL472.

ITAL473 Italian Cinema II - In Translation (3 Credits)
A study of Italian society and culture through the medium of film from the mid 1970's to the present. Taught in English.Also offered as: FILM431.
Credit Only Granted for: ITAL473, ITAL474, or FILM431.

ITAL475 The Italian Opera Libretto in English (3 Credits)
History and analysis of Italian opera librettos from Monteverdi through Mozart to Verdi and Puccini. Taught in English.
Prerequisite: Must have completed one course in literature.
Credit Only Granted for: ITAL475 or ITAL476.

ITAL478 Colloquium in Italian (1 Credit)
Colloquium section taught in Italian to accompany 400-level Italian courses taught in English. Discussion, presentations, readings.
Prerequisite: ITAL311; or students who have taken courses with comparable content may contact the department.
Corequisite: ITAL498, ITAL411, ITAL431, ITAL421, ITAL473, ITAL475, ITAL471, or ITAL499.
Repeatable to: 6 credits.

ITAL497 Senior Project (3 Credits)
Individual independent study of an aspect of Italian literature, culture or society selected according to student interest and need in consultation with a member of the Italian program.
Prerequisite: 4 courses from ITAL400-499 course range; or permission of ARHU-School of Languages, Literatures, and Cultures department.

ITAL498 Special Topics in Italian Literature (3 Credits)

ITAL499 Special Topics in Italian Studies (3 Credits)

JAPN - Japanese

JAPN401 Readings in Modern Japanese Literature (3 Credits)
Development of advanced reading, vocabulary, grammar, and translation skills through selected readings in Japanese drawn primarily from modern literature.
Prerequisite: Minimum grade of C- in JAPN302; or permission of instructor.

JAPN402 Readings in Japanese Cultural Studies (3 Credits)
Development of advanced reading, vocabulary, grammar, and translation skills through selected readings in Japanese drawn from the fields of history, social sciences, cultural studies, film studies, and popular culture.
Prerequisite: Minimum grade of C- in JAPN302; or permission of instructor.

JAPN405 Readings in Advanced Modern Japanese (3 Credits)
Designed to further improve reading and translation skills; the course will include readings from newspaper articles, literary works, and academic publications in the social sciences and humanities. Listening exercises are included.
Prerequisite: JAPN402; or students who have taken courses with comparable content may contact the department; or permission of ARHU-School of Languages, Literatures, and Cultures department.

JAPN407 The Art of Translation (3 Credits)
Theory and practice of translation. Variety of genres. Japanese to English.
Prerequisite: Minimum grade of C- in JAPN401; or students who have taken courses with comparable content may contact the department.

JAPN408 Special Topics in Japanese (3 Credits)
Topic in the Study of Japanese, to be announced each time course is offered. Taught in Japanese.
Prerequisite: Minimum grade of C- in JAPN302; or permission of instructor.

JAPN412 Classical Japanese (3 Credits)
Continuation of JAPN 411 with more advanced classical Japanese.
Prerequisite: JAPN411.

JAPN414 Masterpieces of Classical Japanese Literature in Translation (3 Credits)
Major classics, with focus on philosophical, historical and cultural backgrounds. Taught in English.

JAPN415 Modern Japanese Fiction in Translation (3 Credits)
Major themes and literary developments in fiction from the late 19th century to the present. Emphasis on the works of Kawabata, Tanizaki, Mishima, and Abe.

JAPN418 Japanese Literature in Translation (3 Credits)
Representative works of Japanese literature in translation.
Repeatable to: 9 credits if content differs.

JAPN421 History of the Japanese Language (3 Credits)
Investigation of the origin of the Japanese language, its relationship with other languages, and its development. Taught in English, but presumes knowledge of Kanji (Chinese characters).
Prerequisite: JAPN201; or permission of ARHU-School of Languages, Literatures, and Cultures department.

JAPN422 Introductory Japanese Linguistics (3 Credits)
An investigation of Japanese sound patterns and syntax through a comparison with English.

JAPN424 Japan From the Margins (3 Credits)
Japan from the Margins takes as its focus the history and representations of various others in Japanese society. They include ethnic Ainu, Okinawans, and Koreans, a historical outcaste group called the Burakumin, and people marginalized for their non-normative gender and sexual practices. Students learn about the historical specificities of each group as well as their common experiences of institutional discrimination as they grapple with larger questions regarding prejudice, nationalism, and social justice. Taught in English.
Credit Only Granted for: JAPN498B or JAPN424.
Formerly: JAPN498B.

JAPN425 The Atomic Bomb in Literature and Memory (3 Credits)
Study of declassified documents and commentary on the United States decision to use the bomb in 1945, the many ways Japanese writers have attempted to express their indescribable experiences in Hiroshima and Nagasaki, and the shaping of historical narratives and national identities in post-war Japan and the U.S. Taught in English.
Credit Only Granted for: JAPN498A or JAPN425.
Formerly: JAPN498A.

JAPN428 Seminar in Japanese Discourse and Conversation Analysis (3 Credits)
Presentation and discussion of classic and current readings in English and Japanese on theories and actual practice of discourse and conversation analysis. Students will learn transcription techniques and have an opportunity to apply them in a final term paper.
Prerequisite: JAPN302.
Recommended: JAPN422.
Repeatable to: 6 credits if content differs.

JAPN438 Topics in Japanese Pragmatics (3 Credits)
Basic concepts in the field of pragmatics (the study of language in context) such as deixis and indexicality, speech acts, ellipsis, and politeness. Readings in English on English and Japanese examples.
Prerequisite: JAPN201.
Recommended: JAPN422.
Repeatable to: 9 credits if content differs. Also offered as: JAPN638.

JAPN498 Special Topics in Japanese Studies (3 Credits)
Special topics in Japanese studies. Taught in English.

JAPN499 Directed Study in Japanese (1-3 Credits)

JAPN608 Readings in Advanced Modern Japanese (3 Credits)
To improve reading and translation skills; readings from newspaper articles, literary works, and academic publications in the social sciences and humanities. Listening exercises are included.
Prerequisite: JAPN402; or students who have taken courses with comparable content may contact the department; or permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

JAPN619 Topics in Modern Japanese Literature in Translation (3 Credits)
Current topics in modern Japanese literature in English translation.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 9 credits if content differs.

JAPN628 Seminar in Japanese Discourse and Conversation Analysis (3 Credits)
Presentation and discussion of classic and current readings in English and Japanese on theories and actual practice of discourse and conversation analysis. Students will learn transcription techniques and have an opportunity to apply them in a final term paper.
Prerequisite: JAPN302.
Recommended: JAPN422.
Repeatable to: 6 credits if content differs.

JAPN638 Topics in Japanese Pragmatics (3 Credits)
Basic concepts in the field of pragmatics.
Prerequisite: JAPN201.
Repeatable to: 9 credits if content differs. Also offered as: JAPN438.

JAPN679 Special Topics in Japanese Linguistics (3 Credits)
Current topics in research in Japanese linguistics.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 9 credits if content differs.

JOUR - Journalism

JOUR400 Media Law (3 Credits)
Legal rights and constraints of mass media; libel, privacy, copyright, monopoly, contempt, and other aspects of the law applied to mass communication. Previous study of the law not required.
Prerequisite: JOUR320, JOUR360, or JOUR501.
Restriction: Junior standing or higher.

JOUR402 Journalism Law and Ethics (3 Credits)
An examination of the legal rights and ethical problems and constraints of mass media, including libel, privacy, copyright, monopoly and contempt.
Prerequisite: JOUR201.
Credit Only Granted for: JOUR402 OR JOUR400 and JOUR300.

JOUR405 Breaking News With Numbers: Statistics for Journalists (3 Credits)
Common statistical tools, software and data visualization techniques will be used to allow students to analyze data and solve problems relevant to reporting and writing about politics, sports, criminal justice, business and other fields.
Prerequisite: Minimum grade of C- in JOUR201; and (MATH107 or MATH110; or must have completed a higher level math course). Or have permission of the instructor.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: BIOM301, BMGT230, CCJS200, ECON230, ECON321, EDMS451, GEOG306, GEOL351, GVPT422, INST314, JOUR405, PSYC200 or SOCY201. (These courses do not necessarily meet the same major requirements-check with your advisor to see which of these courses will count for your major).

JOUR434 Salzburg Seminar: Global Media Literacy (3 Credits)
An advanced analysis of the information, values underlying messages conveyed via television, newspapers, the Internet, magazines, radio and film from a cross-cultural perspective. Examines the accuracy of messages and explores how distinctive global media shape views of politics culture and society with nations, across regions and internationally.
Restriction: Must be in Salzburg Academy program. Also offered as: JOUR734.
Credit Only Granted for: JOUR434 or JOUR734.

JOUR435 Salzburg Seminar: Global Change, Global Cooperation (3 Credits)
Practical and theoretical examination of a global problem (or problems) of contemporary importance from a cross-cultural, perspective. Analytical framework used to examine how media shape global problems, events and/or issues regionally.
Restriction: Must be in Salzburg Academy program. Also offered as: JOUR735.
Credit Only Granted for: JOUR435 or JOUR735.

JOUR443 Sports, Society, Culture and the Media (3 Credits)
Designed to explore how sports, society, culture and the media critically relate to each other and the vast audiences of fans and interested parties. Students will study how journalists impact change; how sports shape culture; and how sports are seen throughout the world. College sports, children and sports, the business of sports, the history of sports media and the future of sports in society will be studied as well.
Restriction: Junior standing or higher.
Credit Only Granted for: JOUR459G or JOUR443.
Formerly: JOUR459G.

JOUR451 Advertising and Society (3 Credits)
Advertising as an institution with manifest economic purposes and latent social effects. Influences of advertising on people, and related issues of ethics and social responsibility.
Restriction: Junior standing or higher.

JOUR452 Women in the Media (3 Credits)
Participation and portrayal of women in the mass media from colonial to contemporary times.
Restriction: Junior standing or higher. Also offered as: WMST452.
Credit Only Granted for: JOUR452 or WMST452.

JOUR453 News Coverage of Racial Issues (3 Credits)
Analysis of news media coverage of issues relating to racial minorities in the United States, with special attention to Hispanics, Asian Americans, African Americans and Native Americans.
Restriction: Junior standing or higher.

JOUR455 Media Entrepreneurship (3 Credits)
Basic business and entrepreneurship concepts will be covered and will explore how technology is transforming the business of media. Students develop and pitch ideas for media businesses, learn startup basics, do exercises in Internet advertising and business plan analysis, use social networks and other digital communication tools, and perform other hands-on exercises in business development and presentation.
Credit Only Granted for: JOUR459E or JOUR455.
Formerly: JOUR459E.

JOUR456 Literature in Journalism (3 Credits)
From Truman Capote's In Cold Blood to Mark Bowden's Black Hawk Down, students will examine how literary works can help writers approach a subject in a different way than more traditional forms of journalism, including the advantages and limitations of the style.Also offered as: JOUR673.
Credit Only Granted for: JOUR456 or JOUR673.

JOUR458 Special Topics in Journalism (3 Credits)
Issues of special concerns and current interest.
Repeatable to: 6 credits if content differs.

JOUR459 Special Topics in Journalism (1-3 Credits)
Issues of special concern and current interest. Open to all students.
Repeatable to: 6 credits if content differs.

JOUR462 Professional Seminar in Public Affairs Reporting (3 Credits)
Explore theoretical and practical issues in the press coverage of governments. Examine the complex press-government relationship.
Prerequisite: Permission of JOUR-Philip Merrill College of Journalism.

JOUR470 Journalism and Public Communication Research (3 Credits)
Journalism and public communication research methods used in measuring public opinion and media programs and materials.
Prerequisite: Must have completed a university statistics course.
Credit Only Granted for: JOUR470 or JOUR477.
Formerly: JOUR477.

JOUR471 Public Opinion Research (3 Credits)
Measurement of public opinion and media habits; role of the media in the formation of public opinion.
Prerequisite: Must have completed a university statistics course.

JOUR472 Computer-Assisted Reporting (3 Credits)
Computer and online data acquisition; analytical methods for writing and reporting news.
Prerequisite: JOUR320 or JOUR360.

JOUR476 Researching Emerging Media in Journalism: Past, Present and Future (3 Credits)
Students will examine developments billed as innovative in the current technology-laden news ecology -- such as social media, mobile reporting and virtual reality -- and the blurring of lines between hard news, informed opinion and advocacy. While questions about the future cannot be answered with any certainty, an exploration of the past allows us to see what happened when new technologies, information systems and practices appeared as possible tools for use by journalists and the communities they served. Students will learn to use resources for researching emerging media, including UMD library databases and open access sources. The course will include presentations by the instructor, discussions, field trips, in-class exercises and student presentations. Each student will engage in a research project to understand the experience of emerging media in a decade between 1820 and 1980. Students will also write an essay contemplating current trends and the future of emerging media.
Prerequisite: Must have completed a university statistics course.
Credit Only Granted for: JOUR479W or JOUR476.
Formerly: JOUR479W.

JOUR479 Special Topics in Data Gathering and Analysis (1-3 Credits)
Special research topics for reporting and writing.
Repeatable to: 3 credits.

JOUR480 Capstone Colloquium: The Business of News (1 Credit)
Students will learn the basic news business concepts and examine how revenue and cost structures for media businesses are evolving in new directions. Topics include basic principles and concepts that drive media businesses in the Internet age, including revenue sources, dynamics of online advertising and subscriptions, mobile media strategies, user metrics, engaging audiences, and market dynamics.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism; and junior standing or higher; and permission of JOUR-Philip Merrill College of Journalism.

JOUR600 Journalism Ethics (3 Credits)
Examination of ethical problems in journalism and the media industry.
Prerequisite: Permission of JOUR-Philip Merrill College of Journalism.

JOUR601 Theories of Journalism and Public Communication (3 Credits)
Survey and evaluation of current communication theories. Attention is given to the nature and function of scientific theory, models of communication behavior, the nature of information, social functions of journalism and public communication, attitude change and persuasive communication and theories of language and meaning.
Prerequisite: Permission of JOUR-Philip Merrill College of Journalism.

JOUR603 News Videography (3 Credits)
Introduction to shooting, editing and production of video stories for broadcast and the Web; includes newsgathering in the field.
Prerequisite: JOUR504; and permission of Journalism College required.
Restriction: Permission of JOUR-Philip Merrill College of Journalism. Also offered as: JOUR262.
Credit Only Granted for: JOUR503 or JOUR603.
Formerly: JOUR503.

JOUR604 Introduction to Multimedia Skills for Graduate Certificate Programs (3 Credits)
Examine the basics of producing and editing digital photos, video and audio for news. Topics include framing, lighting and other aspects of composition; sequencing, using wide, medium and tight shots; and ethical considerations when collecting sound and visuals.
Restriction: Permission of JOUR-Philip Merrill College of Journalism; and must not have completed JOUR504.
Credit Only Granted for: JOUR 604, JOUR504, or JOUR628G.
Formerly: JOUR628G.
Additional Information: This course is for students enrolled in graduate certificate programs in the College of Journalism.

JOUR610 Seminar in Mass Media History (3 Credits)
Analysis and discussion of the interrelationships between the mass media and society, including various social and cultural elements of modern society; responsibilities of the mass media and the mass communicator.
Credit Only Granted for: JOUR610 or JOUR710.
Formerly: JOUR710.

JOUR620 Public Affairs Reporting (3 Credits)
Designed to add to and sharpen the skills learned in JOUR501. It is primarily an introduction to "beat" reporting that allows students to sample the most common new beats while reporting and writing on deadline. Students are required to develop and hone their multimedia skills by reporting in a variety of media.
Prerequisite: JOUR501; or permission of JOUR-Philip Merrill College of Journalism.

JOUR623 Mobile Journalism (3 Credits)
A review of several mobile applications and the "hands-on" skills needed to collect and share news in the field. First, students learn how to remotely post information to blogs and social networks. Students then learn and practice the latest location-based production techniques using web services on wireless laptops and mobile devices. Students use laptops (and their own "SmartPhone") to record, edit and upload audio and video.
Prerequisite: Students must have basic computer skills.
Credit Only Granted for: JOUR689M or JOUR623.
Formerly: JOUR689M.

JOUR624 Commentary and Editorial Writing (3 Credits)
Journalistic interpretation and analysis; commentary and editorial writing.
Credit Only Granted for: JOUR624 or JOUR628N.
Formerly: JOUR628N.

JOUR625 Advanced Capital News Service Bureau (6 Credits)
Advanced journalism training. Students report as part of College's Capital News Service program.
Prerequisite: JOUR620; and permission of JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: JOUR625 or JOUR729.
Formerly: JOUR729.

JOUR627 Urban Affairs Reporting (3 Credits)
Students are immersed in coverage of issues affecting cities, working on a semester-long multi-platform reporting project based in Baltimore.
Prerequisite: JOUR501; and permission of JOUR-Philip Merrill College of Journalism.
Corequisite: JOUR620; or permission of JOUR-Philip Merrill College of Journalism. Also offered as: JOUR327.
Credit Only Granted for: JOUR327 or JOUR627.

JOUR628 Specialized Topics in News Writing and Reporting (1-3 Credits)
Advanced training and practice in writing and reporting news. Repeatable to a maximum of six credits provided the content differs.
Credit Only Granted for: JOUR628 or JOUR728.
Formerly: JOUR728.

JOUR652 Interactive Design and Development (3 Credits)
Conceptualize, wireframe, design and build responsive Web pages using HTML, style sheets and other coding tools; work with open source interactive tools and JavaScript libraries to create charts, timelines and maps to tell stories.
Corequisite: Offered to students enrolled in the journalism master's degree or certificate. Master's degree students should take JOUR 504 as a pre- or co-requisite. Certificate students are encouraged to take JOUR 604 as a co-requisite.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: JOUR652 or JOUR352.

JOUR654 Advanced Interactive Multimedia Storytelling (3 Credits)
Learning and applying Flash and/or other interactive tools to assemble multiple media (i.e. graphics, video, etc.) to create interactive narratives.
Prerequisite: JOUR652; and permission of JOUR-Philip Merrill College of Journalism.

JOUR655 Advanced Online News Bureau (6 Credits)
Advanced online journalism training. Students work as online reporters, editors and producers for a news site. Students also package copy from the print and broadcast news bureaus.
Prerequisite: JOUR603 or JOUR620; and (JOUR504 and JOUR652). Or permission of JOUR-Philip Merrill College of Journalism.

JOUR656 Advanced Kaiser Health Multimedia Reporting (3 Credits)
Advanced reporting on health topics, using traditional and multimedia storytelling tools.
Prerequisite: JOUR504.
Corequisite: JOUR620 or JOUR503.
Restriction: Permission of instructor.

JOUR660 Broadcast News Writing (3 Credits)
Descriptive and critical analysis of broadcast news; methods of evaluation of news judgments; decision-making and organizational aspects of the broadcast news industry.
Prerequisite: JOUR501.
Credit Only Granted for: JOUR660 or JOUR760.
Formerly: JOUR760.

JOUR661 Television Reporting and Production (3 Credits)
Reporting, writing, editing and production of broadcast news.
Prerequisite: JOUR603; or students who have taken courses with comparable content may contact the department.
Restriction: Must not be in Journalism Studies (Doctoral) program.

JOUR662 Broadcast News Producing (3 Credits)
Learn and practice the basics of broadcast newscast producing. Design, write, edit and implement a news program.
Prerequisite: Must have completed or be concurrently enrolled in JOUR661; and (JOUR603 and JOUR660). Also offered as: JOUR362.
Credit Only Granted for: JOUR668B or JOUR662.
Formerly: JOUR668B.

JOUR663 Long Form Broadcast Journalism (3 Credits)
Productions of long form broadcast news reporting, reality videos or documentaries.
Prerequisite: JOUR503 or JOUR603; and JOUR661. Or students who have taken courses with comparable content may contact the department. Also offered as: JOUR363.
Credit Only Granted for: JOUR363, JOUR486, or JOUR663.
Formerly: JOUR486.

JOUR664 Radio Broadcasting (3 Credits)
Students apply news reporting skills to prepare and produce a weekly radio news magazine program.
Prerequisite: JOUR501 and JOUR603; or permission of JOUR-Philip Merrill College of Journalism.
Restriction: Permission of JOUR-Philip Merrill College of Journalism.

JOUR665 Patch U:Hyper-Local News Production (3 Credits)
Patch U: Hyper Local News Production for graduate students.
Prerequisite: JOUR501 and JOUR504; or permission of JOUR-Philip Merrill College of Journalism.
Corequisite: JOUR620 and JOUR652; or permission of JOUR-Philip Merrill College of Journalism.
Restriction: Permission of JOUR-Philip Merrill College of Journalism. Also offered as: JOUR337.
Credit Only Granted for: JOUR389P, JOUR337 or JOUR665.

JOUR667 Broadcast News Bureau (6 Credits)
Advanced broadcast journalism training. Students report as part of the College's Capital News Service program.
Prerequisite: JOUR503; or students who have taken courses with comparable content may contact the department. And permission of JOUR-Philip Merrill College of Journalism.

JOUR668 Topics in Broadcasting and Electronic Media (1-3 Credits)
Advance research and analysis of selected topics in broadcast journalism.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: JOUR668 or JOUR768.
Formerly: JOUR768.

JOUR670 Photojournalism (3 Credits)
Examining the basics of shooting, editing and storytelling with still photos taken with 35mm digital cameras. Students shoot portraits, feature photos and action shots. Final project is a photo story/essay.
Prerequisite: JOUR504.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism; and permission of JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: JOUR 368P, JOUR 370 or JOUR 670.
Additional Information: Students are required to borrow, rent or purchase a 35mm digital camera. Contact department for camera specifications.

JOUR680 Science Communication (3 Credits)
Advanced professional training in science reporting and writing for the mass media and in technical communication to specialized audiences. Communication behaviors of scientists and audiences. Application of communication theory and the history and philosophy of science to science writing.

JOUR681 Media Industry Reporting (3 Credits)
Students hone their reporting and writing skills as they produce work for the Web site of an award-winning professional publication, and immerse themselves in the news industry, which is undergoing dramatic transformation in the digital age.
Prerequisite: JOUR501; or permission of JOUR-Philip Merrill College of Journalism.
Corequisite: JOUR620; or permission of JOUR-Philip Merrill College of Journalism.
Restriction: Permission of JOUR-Philip Merrill College of Journalism. Also offered as: JOUR381.
Credit Only Granted for: JOUR381 or JOUR681.

JOUR689 News Coverage of Specialized Topics (1-3 Credits)
Advance training and practice in writing and reporting news in on specialized field of interest.
Prerequisite: JOUR620; or JOUR660.
Repeatable to: 6 credits if content differs.

JOUR698 Special Problems in Communication (1-3 Credits)
Independent study in area of the student's interest.
Repeatable to: 6 credits.

JOUR700 Seminar in Media Law (3 Credits)
Legal rights and constraints of mass media; libel, privacy, copyright, monopoly, and contempt, and other aspects of the law applied to mass communication.
Restriction: Must be in one of the following programs (Journalism - Master (Master's); Journalism Studies (Doctoral)) ; or permission of JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: JOUR400, JOUR700, or JOUR755.
Formerly: JOUR755.

JOUR702 Journalism Law and Ethics (3 Credits)
An examination of the legal rights and ethical problems and constraints of mass media, including libel, privacy, copyright, monopoly and contempt.
Restriction: Must be in one of the following programs (Journalism - Master (Master's); Journalism Studies (Doctoral)) ; or permission of JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: JOUR400, JOUR 600, JOUR700, or JOUR 702.

JOUR716 History of Investigative Journalism (3 Credits)
Graduate students will learn the history of investigative journalism in the U.S., focusing on key time periods from colonial times to the present.
Restriction: Permission of instructor.

JOUR722 Mediacentric Politics (3 Credits)
Examination of the growing use of the media image and issues in electorial politics and interest-group advocacy.
Prerequisite: JOUR601.

JOUR725 Political Communication (3 Credits)
Critical examination of the interplay between the media, government and the political process.
Prerequisite: JOUR601 or JOUR801.

JOUR729 Reporting from Annapolis and Washington (6 Credits)
Advanced training in public affairs journalism. Students report state and federal news as part of College's Capital News Service.
Repeatable to: 12 credits if content differs.

JOUR734 Salzburg Seminar: Global Media Literacy (3 Credits)
An advanced analysis of the information, values and underlying messages conveyed via television, newspapers, the Internet, magazines, radio and film from a cross-cultural perspective. Examines the accuracy of messages and explores how distinctive global media shape view of politics, culture and society within nations, across regions and internationally.
Restriction: Must be in Salzburg Academy program. Also offered as: JOUR434.
Credit Only Granted for: JOUR434 or JOUR734.

JOUR735 Salzburg Seminar: Global Change, Global Cooperation (3 Credits)
Practical and theoretical examination of a global problem (or problems) of contemporary importance from a cross-cultural, perspective. Analytical framework used to examine how media shape global problems, events and/or issues regionally.
Restriction: Must be in Salzburg Academy program. Also offered as: JOUR435.
Credit Only Granted for: JOUR435 or JOUR735.

JOUR738 Topics in International and Cross-Cultural Communication (3 Credits)
Specialized topics in the fields of comparative journalism and mass communications and in the field of cross-cultural communication.
Repeatable to: 6 credits if content differs.

JOUR762 Professional Seminar in Public Affairs Reporting (3 Credits)
Examination of theoretical and practical issues in the press coverage on government and public affairs.
Prerequisite: JOUR620; and permission of JOUR-Philip Merrill College of Journalism.
Restriction: Must not have completed JOUR462.

JOUR763 Seminar in Newsroom Management (3 Credits)
Organization, operation, and administration of the departments of a newsroom: advertising, business-finance, circulation, news-editorial, personnel, production and promotion.
Credit Only Granted for: JOUR481, JOUR675, or JOUR763.
Formerly: JOUR675.

JOUR772 Methods in Computer-Assisted Reporting (3 Credits)
Computer-assisted (database) journalism; obtaining, manipulating and analyzing complex government data for journalism projects.
Prerequisite: Must have completed or be concurrently enrolled in JOUR501; or students who have taken courses with comparable content may contact the department.

JOUR775 Quantitative Methods in Journalism and Public Communication Research (3 Credits)
Logic and methods of quantitative data collection and statistical analysis as applied to journalism and public communication studies.
Credit Only Granted for: JOUR701 or JOUR775.
Formerly: JOUR701.

JOUR776 Qualitative Research Methods in Journalism and Public Communication (3 Credits)
Methods of historical, critical and field research in journalism and public communication. Formulation of significant research questions, systematic collection of bibliographic and phenomenal information, formulating substanial claims, organizing and writing research for disciplinary outlets.
Credit Only Granted for: JOUR711 or JOUR776.
Formerly: JOUR711.

JOUR777 Advanced Historical/Critical Methods in Journalism and Public Communication (3 Credits)
Critical assessment of qualitative approaches to public communication. Introduction to significant schools of historical and critical research. Advanced techniques for inquiry and manuscript preparation. Students must have a dissertation research project requiring historical or critical theory.
Credit Only Granted for: JOUR712 or JOUR777.
Formerly: JOUR712.

JOUR779 Seminar in Research Problems (1-3 Credits)
Methods of research design and analysis in specialized areas of journalism and public communication research.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: JOUR779 or JOUR780.
Formerly: JOUR780.

JOUR798 Master's Professional Fieldwork (1-6 Credits)
Research for and preparation of news articles or programs for use in the media. Analysis of fieldwork experience using communication theory and research results. Fieldwork may be done independently or as an internship. Repeatable to a maximum of six credits.
Repeatable to: 6 credits.

JOUR799 Master's Thesis Research (1-6 Credits)

JOUR800 Introduction to Doctoral Study in Journalism and Public Communication (3 Credits)
Basic skills in journalism and public communication research.
Credit Only Granted for: JOUR700 or JOUR800.
Formerly: JOUR700.

JOUR801 Advanced Public Communication Theory (3 Credits)
Advanced selected survey of communication & media theory.
Prerequisite: JOUR601; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: JOUR601 or JOUR801.

JOUR808 Doctoral Colloquium (1-3 Credits)
Guided discussion of professional and theoretical topics.
Prerequisite: Must have completed or be concurrently enrolled in JOUR800.
Repeatable to: 4 credits if content differs.

JOUR818 Seminar in Communication Theories and Journalism Practice (3 Credits)
Critical examination of existing theory and/or journalism practices suggesting hypotheses and formulating proposals for future research.
Prerequisite: Must have completed or be concurrently enrolled in JOUR800.
Repeatable to: 6 credits if content differs.

JOUR888 Doctoral Professional Field Work (1-9 Credits)
Critical analysis of a phase of a professional field in journalism and public communication. Analysis of professional activity through personal observation. Evaluation of the purpose, process, effectiveness, and efficiency of professional activity. Recommendations for training and further research.
Repeatable to: 9 credits if content differs.
Formerly: PCOM888.

JOUR889 Doctoral Tutorial in Journalism and Public Communication (1-9 Credits)
Individual research in journalism and public communication.
Repeatable to: 9 credits if content differs.
Formerly: PCOM889.

JOUR898 Pre-Candidacy Research (1-8 Credits)

JOUR899 Doctoral Dissertation Research in Journalism and Mass Communication (1-8 Credits)

JWST - Jewish Studies

JWST408 Honors Seminar in Jewish Studies (3 Credits)
An in-depth exploration of a theme in Jewish history, literature, culture or thought. Course subject and readings will vary from year to year, but will generally cut across periods, locations, or disciplines. Students are expected to engage the course material critically and to use the seminar as an opportunity to develop an independent research agenda.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Restriction: Junior standing or higher.

JWST409 Research Seminar in Jewish Studies (3-4 Credits)
A capstone course for Jewish Studies. Guides students through advanced source material and subject matter, research skills, and presentation techniques. A substantive paper based on independent research and analysis is one expected outcome.
Prerequisite: Must have completed two upper-level courses in an appropriate area of Jewish Studies; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 9 credits if content differs.
Formerly: JWST309.

JWST418 Honors Thesis Research in Jewish Studies (3-6 Credits)
Guided research on a thesis under the supervision of the Jewish Studies faculty.
Repeatable to: 6 credits if content differs.

JWST419 Special Topics in Jewish Studies (3 Credits)

JWST429 Advanced Topics in Jewish Studies (3-4 Credits)
Special topics at an advanced level for Jewish Studies. Primarily intended for majors and graduate students.
Repeatable to: 12 credits if content differs.

JWST430 Dead Sea Scrolls (3 Credits)
A study of the Dead Sea Scrolls in their ancient and modern settings, and in terms of contemporary scholarly interpretations of their meaning. Interpretations of the historical significance of these documents, their connections to ancient Jewish sectarian movements, and their implications for our understanding of Judaism, Christianity, and the history of the Bible.
Prerequisite: Must have completed one JWST course or one RELS course; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies. Also offered as: RELS430.
Credit Only Granted for: JWST429Q, JWST430, RELS419Q,or RELS430.
Formerly: JWST429Q.

JWST432 Jews in Medieval Times 1000-1450 (3 Credits)
Social and cultural life of Jewish communities spread throughout Islam and Christendom. Major topics include the Gaonate; kehila organization; legal, rationalist, and mystical thought; and the context of rising animosity linked to the Crusades and changing Church doctrines.
Recommended: HIST282, JWST234, HIST330, or HIST331. Also offered as: HIST476.
Credit Only Granted for: HIST419R, HIST476, or JWST432.
Formerly: JWST429M.

JWST451 Issues in Jewish Ethics and Law (3 Credits)
Philosophical and meta-legal questions concerning the nature of Jewish law and its relation to morality.
Prerequisite: Must have completed 3 credits in philosophy or Jewish studies (excluding Hebrew language); or permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Credit Only Granted for: JWST451, or PHIL433.

JWST452 The Golden Age of Jewish Philosophy (3 Credits)
Jewish philosophy from Maimonides in the 12th Century to the expulsion of the Jews from Spain at the end of the 15th Century. Topics include the limitations of human knowledge, creation of the world, foreknowledge and free will, and the existence of God.
Prerequisite: 3 credits in PHIL courses; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Restriction: Must not have completed PHIL417. Also offered as: PHIL417.
Credit Only Granted for: JWST452 or PHIL417.

JWST453 Philosophy of Spinoza (3 Credits)
An investigation of the metaphysical, ethical, and political thought of the 17th century philosopher Benedict Spinoza.
Prerequisite: 6 credits in PHIL courses; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Restriction: Must not have completed PHIL424. Also offered as: PHIL424.
Credit Only Granted for: JWST453 or PHIL424.

JWST459 Readings in Medieval Hebrew (3-4 Credits)
Readings and analysis of Hebrew texts and literature from the Middle Ages. Language of instruction in English; all texts in Hebrew.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: JWST459 or JWST466.
Formerly: JWST466.

JWST468 Readings in the Hebrew Bible (3-4 Credits)
Readings in the Hebrew text of the Bible. Emphasis in close reading, grammar analysis, and modern interpretations of the Bible. Language of instruction English; all texts in Hebrew.
Prerequisite: HEBR313; or permission of instructor.
Repeatable to: 9 credits if content differs.
Formerly: HEBR441 and HEBR442.

JWST469 Readings in Rabbinic Hebrew (3-4 Credits)
Readings in classical rabbinic texts and related corpora. Emphasis on grammar and reading skills as well as critical analysis of the material. Language of instruction: English; all texts in original language.
Prerequisite: HEBR313; or permission of instructor.
Repeatable to: 9 credits if content differs.

JWST471 Modern Hebrew Literature in Translation (3 Credits)
An exploration of modern Hebrew prose, poetry, and literary essays written from the 1880s through the present in Europe, Palestine, and Israel. An investigation of the challenges confronting authors such as Mendele Mokher Sforim, Avraham Mapu, Chaim Nahman Bialik, Dvorah Baron, S.Y. Agnon, and David Fogel as they tried to create a contemporary secular literature out of an ancient sacred language. All texts in English translation.

JWST478 Readings in Modern Hebrew (3 Credits)
Variable topics in Modern Hebrew Literature.
Prerequisite: HEBR313; or permission of instructor.
Restriction: Junior standing or higher.
Repeatable to: 12 credits if content differs.

JWST491 Judaism and the Construction of Gender (3 Credits)
The study of Jewish culture, religious practice, communal authority, and literature through the frame of such critical categories of analysis as gender, sexuality, masculinity, power, ethics, and the feminine.
Prerequisite: 1 course in JWST; or 1 course in LGBT; or 1 course in WMST. Also offered as: WMST491.
Credit Only Granted for: JWST419X, JWST491, or WMST491.
Formerly: JWST419X.

JWST492 Sex, Gender, & Jewish Identity (3 Credits)
An exploration of Jewish embodiment, including dynamics related to biological sex, culturally-framed gender, and sexuality. Topics of discussion may include transgender and intersex Jews, stereotypes and gender performance, modesty, genetics, and body alteration. Focus is on contemporary Jewish culture, framed within the larger historical and textual tradition.
Prerequisite: 1 course in WMST; or 1 course in JWST; or 1 course in LGBT; or permission of instructor.
Credit Only Granted for: JWST492, JWST409G, JWST419W, LGBT448W, or WMST498W.
Formerly: JWST409G and JWST419W.

JWST498 Advanced Language Module for Jewish Studies (1-3 Credits)
A supplementary language module for students enrolled in designated Jewish Studies classes. Language of instruction English, texts in original language.
Prerequisite: HEBR212 or JWST282; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies.

JWST499 Independent Study in Jewish Studies (1-3 Credits)

JWST600 General Seminar in Jewish Studies (3 Credits)
Introduce graduate students to the fields, problems, and basic methods of research in the comtemporary practice of Jewish Studies. Consideration of chronological and historiographical problems, questions of the development of Jewish thought and literature and Jewish religious and cultural history in four rough chronological periods: Biblical Israel, Judaism in Antiquity, Judaism in the Middle Ages and Early Modern Period, and Modern Judaism.

JWST609 Supervised Instruction-Practicum in Jewish Studies (1 Credit)
Supervised instruction or supervised practicum in Jewish Studies. Intended for graduate students whose course work includes field work or classroom teaching.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.

JWST619 Directed Readings in Jewish Studies (3 Credits)
Independent Study in Jewish Studies. Readings and papers.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

JWST648 Readings in Jewish History (3 Credits)
Focus on the central issues in Jewish history as well as the key historiographical debates on those issues.
Repeatable to: 9 credits if content differs.

JWST658 Readings in Jewish Thought and Culture (3 Credits)
Examines key issues in the development of Jewish thought and culture.
Repeatable to: 9 credits if content differs.

JWST678 Readings in Jewish Literature (3 Credits)
Examines selected themes or literatures in the development of Jewish literary traditions.
Repeatable to: 9 credits if content differs.

JWST699 Independent Graduate Readings in Jewish Studies (1-3 Credits)
Independent readings or guided research in a field of Jewish Studies with a member of the Jewish Studies graduate faculty.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

JWST719 Readings in Jewish Studies (3 Credits)
Course exposes students to significant primary and secondary material on selected topics as well as the major methodological problems covered by professional scholars working on these topics.
Repeatable to: 99 credits if content differs.

JWST799 Masters Thesis Research (1-6 Credits)
Research and Writing the Masters Thesis in Jewish Studies.
Repeatable to: 6 credits.

KNES - Kinesiology

KNES400 The Foundations of Public Health in Kinesiology (3 Credits)
An investigation of the role of physical activity and inactivity in relation to health and well-being through a public health perspective. Past and current perspectives on health promotion, health education, and social policies and approaches will be examined for various populations.
Prerequisite: Minimum grade of C- in KNES287.
Restriction: Senior standing or higher; and must be in a major within the SPHL-Kinesiology department.
Credit Only Granted for: KNES400 or KNES498A.
Formerly: KNES498A.

KNES402 Biomechanics of Sport (3 Credits)
Mechanical determinants influencing sport techniques. A quantitative, scientific basis for sport analysis with emphasis on the application to numerous sport activities. Evaluation and quantification of the filmed performance of athletes.
Prerequisite: KNES300.

KNES405 Principles & Techniques of Manual Muscle Testing (3 Credits)
It is critical for sports medicine and sport performance specialists to understand the location and inter-relationships of the structures of the body that impact human movement. Thus, the primary purpose of this course is to facilitate an in-depth, understanding of the muscles of the body. Specifically, students will learn the origins, insertions, primary and secondary functions, as well as nervous innervations of the major muscle groups of the body. In addition, students will develop palpation skills and learn to grade the function of each muscle through manual muscle testing techniques. These skills form the foundation for assessing functional movement as well as performing safe and effective manual therapy techniques. Thus, while the focus of the class will be to develop sound, introductory palpation and manual muscle testing skills, basic principles of functional movement and manual therapy will also be addressed through hands-on application as well as case study.
Prerequisite: Minimum grade of C- in BSCI201, BSCI202, and KNES300.

KNES440 Psychology of Athletic Performance (3 Credits)
Examines the psychological factors, mechanisms, and processes in athletic performance. Utilizes a social psychological approach to focus on the study and review of individual performance in both the interpersonal and social context.
Prerequisite: KNES350.
Restriction: Junior standing or higher.
Credit Only Granted for: KNES498P, KNES689Z, or KNES440.

KNES442 Psychology of Exercise and Health (3 Credits)
Examines the antecedents and consequences of exerciese behavior. Explores motivation, attitude, control, socialization. Proposes intervention strategies at the individual, organizational and societal levels.
Prerequisite: KNES350.
Restriction: Junior standing or higher.
Credit Only Granted for: KNES442 or KNES498O.
Formerly: KNES498O.

KNES451 Children and Sport: A Psychosocial Perspective (3 Credits)
Examination of youth sports from a psychosocial perspective, including the impact of highly structured sports on young athletes and the complex social network of coaches, parents and peers.
Prerequisite: KNES350.
Restriction: Junior standing or higher; and must be in a major within SPHL-Kinesiology department.

KNES455 Physical Fitness of the Individual (3 Credits)
An examination of physical fitness/athletic conditioning programs stressing the practical application of exercise physiology theory for enhancing athletic performance. Cardiovascular considerations, strength and power development, nutrition, speed, muscular endurance, environmental considerations and ergogenic aids.
Prerequisite: KNES360.

KNES457 Managing Youth Programs: Educational, Fitness and Sport (3 Credits)
An examination of the basic functions involved in managing physical education, fitness, and youth sports programs. Focus on leadership skills, organizational management, and techniques for applying learned skills in a variety of organizational settings that serve the nation's youth.
Prerequisite: KNES370 and KNES287.
Restriction: Junior standing or higher.
Credit Only Granted for: KNES457 or KNES498Y.

KNES460 Physiology of Aging and the Impact of Physical Activity (3 Credits)
Biology of the aging process in healthy individuals and those with chronic disease, the effects of acute exercise and exercise training on the physiological decline that occurs in humans, and the role that regular physical activity plays on enhancing the quality of life and activities of daily living in individuals.
Prerequisite: KNES360.
Credit Only Granted for: KNES498F or KNES460.
Formerly: KNES498F.

KNES461 Exercise and Body Composition (3 Credits)
An in-depth overview on how body composition is measured, what it is composed of, and the physiological and biochemical signals that change it. The effects of acute and chronic exercise on food storage, breakdown, and use as an energy source, is the major focus. This information is applied to important issues in public health and athletic performance.
Prerequisite: KNES360.

KNES462 Neural Basis of Human Movement (3 Credits)
An introduction to the neural substrates which underlie postural and volitional movement. Neuroanatomical and neurophysiological basis of motor functioning; past and present conceptualizations of motor control and coordination; movement disorders; and maturation of the neuromuscular system.
Prerequisite: BSCI202, KNES385, and BSCI201; or permission of SPHL-Kinesiology department.

KNES463 Principles and Methods of Physical Activity Interventions (3 Credits)
Understanding of the planning, implementation, and evaluation of physical activity interventions. Intervention methods and practical strategies fo formulate well-conceived physical activity interventions across a variety of settings and participant populations.
Prerequisite: KNES360 and KNES350.
Credit Only Granted for: KNES463 or KNES498G.

KNES464 Exercise Metabolism: Role in Health and Disease (3 Credits)
Examines the role of metabolism in kinesiology, especially as it relates to physical inactivity, health and disease. Includes bioenergetics, substrate utilization, cell signaling, and metabolic gene expression and their impact on chronic health conditions or disease.
Prerequisite: BSCI202, KNES360, and BSCI201.
Credit Only Granted for: KNES464 or KNES498L.

KNES465 Physical Activity and Disease Prevention and Treatment (3 Credits)
Critically examines the scientific evidence that supports the use of physical activity to prevent and treat age-related diseases, including cardiovascular disease, diabetes, abnormal lipoprotein-lipid levels, hypertension, obesity, osteoporosis and cancer.
Prerequisite: KNES360.
Credit Only Granted for: KNES465 or KNES498A.

KNES466 Graded Exercise Testing (3 Credits)
Functional and diagnostic examination of the cardiovascular responses to graded exercise testing. Emphasis on electrophysiology, mechanisms of arrhythmias, normal electrical activation of the heart, axis termination and the normal 12-lead electrocardiogram.
Prerequisite: KNES360; or permission of SPHL-Kinesiology department.

KNES467 Genetics in Physical Activity and Sport (3 Credits)
Dedicated to understanding the role of genetics in kinesiology, especially within the contexts of physical activity and sport. Specific genes and phenotypes will be explored.
Prerequisite: KNES360.
Corequisite: STAT100; or students who have taken courses with comparable content may contact the department.
Restriction: Junior standing or higher.
Credit Only Granted for: KNES467 or KNES498Q.

KNES476 Honors Thesis Proposal (3 Credits)
Development of honors thesis proposal based on preliminary research and literature review. Presentation of formal proposal to the thesis committee and fellow honors students.
Corequisite: KNES478.
Restriction: Must be a KNES Honors student; and senior standing.
Credit Only Granted for: KNES476 or KNES498R.

KNES477 Honors Thesis (3 Credits)
Advisement will be on the individual basis. Thesis must be defended in the honors seminar.
Prerequisite: KNES476.
Corequisite: KNES478.
Restriction: Must be a KNES Honors student; and senior standing.
Credit Only Granted for: KNES399 or KNES477.

KNES478 Honors Seminar (1-3 Credits)
Guided discussion of research topics of current interest.
Restriction: Must be a KNES Honors student; and junior standing or higher.
Repeatable to: 4 credits if content differs.
Credit Only Granted for: KNES398 or KNES478.

KNES482 Socio-behavioral Aspects of Human Movement (3 Credits)
Derivation, formulation, and application of research in the socio-behavioral aspects of human movement.
Prerequisite: KNES293, KNES350, and KNES287.

KNES483 Sport Marketing and Media (3 Credits)
Industry practices in sport marketing and media. Marketing strategies and consumer behavior in different sport contexts. Critical examination of selected social and economic issues related to the buying and selling of sport.
Prerequisite: KNES287.
Restriction: Junior standing or higher; and must be in a major within SPHL-Kinesiology department.

KNES484 Sporting Hollywood (3 Credits)
Popular representations of sport within the film media related to wider social discourses on bodies and the politics of various categories of subjectivity (gender, sexual, racial, class and national).
Prerequisite: KNES293 and KNES287.
Restriction: Junior standing or higher.
Credit Only Granted for: KNES484 and KNES498N.

KNES485 Sport and Globalization (3 Credits)
Examination of sport culture from a global perspective; focuses on theorizing the similarities and differences between various national sporting cultures.
Prerequisite: KNES287.
Restriction: Junior standing or higher.

KNES487 Women, Sports and Culture (3 Credits)
A study of the historical barriers to women's participation in physical activity, efforts to dismantle those barriers, and the differentiation that exists in women's sport and physical culture today. Exploration of the historical and contemporary factors involving female athletes in U.S. culture.
Prerequisite: KNES287.
Restriction: Junior standing or higher.
Credit Only Granted for: KNES498E or KNES487.

KNES496 Quantitative Methods (3 Credits)
Statistical techniques most frequently used in research pertaining to physical education. Effort is made to provide the student with the necessary skills and to acquaint the student with the interpretations and applications of these techniques.

KNES497 Kinesiology Senior Seminar (3 Credits)
Discussions of contemporary issues vital to the discipline, critiques of research in the student's area/areas of special interest, completion of a major project where the student will be asked to demonstrate the ability to carry out investigative processes in problem solving and critical writing under faculty direction.
Prerequisite: A professional writing course with a minimum grade of C-; and must have completed 6 KNES core courses and 2 KNES option courses, all with a C- or higher; and must have completed STAT100 with a C- or better.
Restriction: Senior standing or higher; and must be in Kinesiology program; and permission of department.

KNES498 Special Topics in Kinesiology (3 Credits)
Topics of special interest in areas not covered by regularly scheduled courses.
Prerequisite: Permission of SPHL-Kinesiology department.
Repeatable to: 99 credits if content differs.

KNES600 Kinesiology in Public Health (3 Credits)
A broad introduction to public health within the context of the discipline of kinesiology, focusing on furthering the understanding of the ways kinesiology contributes toward achieving the goals of public health.

KNES601 Epidemiology of Physical Activity (3 Credits)
An exploration of basic epidemiological study design, methods, and health outcomes in the field of physical activity.
Prerequisite: KNES600; and must have completed an undergraduate statistics course (e.g., STAT100 or equivalent).

KNES602 Physical Activity Program Planning and Evaluation (3 Credits)
An in-depth analysis of the planning, implementation, and evaluation of physical activity interventions and programs intended to achieve physical activity and public health goals.
Recommended: KNES600.

KNES604 Development of Posture and Locomotion (3 Credits)
Development of posture and locomotion in humans integrating the perspectives of biomechanics, neurophysiology, perception-action theory and dynamical systems.

KNES609 Research Issues in Kinesiology (1-3 Credits)
Issues, methodologies, and critical analyses of current research in Kinesiology.
Prerequisite: Permission of SPHL-Kinesiology department.
Repeatable to: 6 credits.

KNES610 Methods and Techniques of Research (3 Credits)
Studies methods and techniques of research used in Kinesiology; an analysis of examples of their use; and practice in their application to problems of interest to the student.

KNES612 Qualitative Research (3 Credits)
Theoretical frameworks and methodologies necessary to conduct qualitative research, including research designs, observation and interview methods, data analysis, and development of grounded theory.

KNES613 Theories Physical Culture (3 Credits)
Examines and assesses numerous social and cultural theories as frameworks for critically interpreting the varied institutions, ideologies, and embodiments of physical culture.
Credit Only Granted for: KNES613 or KNES689I.
Formerly: KNES689I.

KNES614 Cultural Studies and Physical Culture (3 Credits)
Discusses the political commitments, constituents, and complexities of cultural studies, and their relevance for furthering the understanding of physical culture and the project of physical cultural studies.
Credit Only Granted for: KNES614 or KNES689P.
Formerly: KNES689P.

KNES615 The Body, Culture, and Physical Activity (3 Credits)
Critically examines the social constitution and embodied experience of various empirical fields of physical culture, including sport, health, movement, exercise, recreation dance, and daily living related activities.

KNES618 Current Readings in Exercise and Applied Physiology (1 Credit)
Student-led presentations of contemporary literature in the areas of genetics, exercise science, fitness and health. Emphasis on papers describing new research findings, novel techniques, innovative methods, and emerging issues.
Prerequisite: KNES360; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: KNES618, KNES609P, or KNES609N.

KNES660 Psychology of Athletic Performances (3 Credits)
Psychological factors, mechanisms, and processes in athletic performance. The basic approach is social psychological, according to which the focus is on individual performance in the interpersonal athletic context. Intrapersonal and interpersonal factors and their effects on athletic performance. Psychology of peak performance, choking, and errors of mental control. Analysis of the general principles and types of mental training.
Prerequisite: KNES350.
Credit Only Granted for: KNES660 or KNES689Z.
Formerly: KNES689Z.

KNES663 History of Sport in Western Culture (3 Credits)
The history of sport in the ancient, medieval and renaissance West.

KNES670 Biomechanics Theory (3 Credits)
Theoretical basis for understanding the investigation of biomechanical aspects of the human body. Integration of subject matter from physics, engineering, anatomy, kinesiology, and physiology as it relates to the study of human motion and the body as a mechanical system.
Prerequisite: MATH121 or MATH141; or must have completed MATH221.

KNES676 Multisensory Perception and Human Motor Control (3 Credits)
Overview of the major sensory inputs to human motor control and spatial orientatin including auditory, somatosensory, visual and vestibular.

KNES688 Seminar in Motor Learning and Performance (3 Credits)
Discussion of research dealing with advanced topics in motor learning and skilled performance. Recent developments concerning individual differences, refractoriness, anticipation and timing, transfer, retention, and work inhibition are emphasized.
Prerequisite: KNES385 and KNES496.
Repeatable to: 6 credits.

KNES689 Special Problems in Kinesiology (1-6 Credits)
Master or doctoral candidates who desire to pursue special research problems under the direction of their advisor may register for 1-6 hours of credit under this number.

KNES691 Muscular Aspects of Exercise Physiology (3 Credits)
Skeletal muscle structure and function including muscle development, excitation-contraction coupling, muscle fiber types and fatigue, muscle biochemistry, gene expression, muscle damage and regeneration. The effects of aging and exercise training on skeletal muscle.
Prerequisite: KNES360.
Recommended: BSCI422.

KNES692 Cardiovascular Aspects of Exercise Physiology (3 Credits)
A comprehensive consideration of the various cardiovascular factors affecting human physical performance. Emphasis on the regulation of cardiovascular functions during physical activity. Energy liberation and transfer, circulation, respiration, temperature regulation, physiology of work at altitudes, aerobic endurance training, and exercise, health and aging.
Prerequisite: KNES360.

KNES694 Metabolic Aspects of Exercise Physiology (3 Credits)
Effects of exercise on digestion, absorption, transport, storage, mobilization, and utilization of macronutrients. Emphasis on the effects of exercise training on energy metabolism.
Prerequisite: KNES360.
Recommended: BCHM462 and BCHM461.

KNES695 Laboratory Techniques in Exercise Physiology (3 Credits)
Lab exercise testing techniques and interpretation. Includes graded exercise testing, VO2 max, lactate threshold, phlebotomy, exercise economy, body composition, muscle biopsy, resting metabolic rate, anaerobic power and blood flow.
Prerequisite: KNES360.

KNES696 Genetic Aspects of Health and Fitness (3 Credits)
An exploration of the impact of genetic variation on human health and fitness, with emphasis on the physiological response to exercise. Consideration of human genome biology, DNA sequence databases, methods, gene/environment interaction, and ethical issues.
Prerequisite: KNES360; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: KNES696 and KNES689Z.
Formerly: KNES689Z.

KNES711 Professional Development and Grantsmanship (3 Credits)
Enhance continued professional development through an exploration of culture, climate, expectations and mentoring in research I universities. Generate a grant application including the hypothesis, structure, specific aims, background and significance, and submission of a total grant. Grant process and product will be emphasized.
Restriction: Must be a Doctoral student; and must be in a major in SPHL-School of Public Health.
Credit Only Granted for: KNES711 or KNES789X.
Formerly: KNES789X.

KNES778 Internship in Physical Activity and Public Health (1-4 Credits)
The internship is a time-limited, supervised period of public/community health activities carried out in a health or allied health organization involved with physical activity. Students gain practical experience in areas such as program planning and implementation, program evaluation, public policy analysis, research, and management.
Prerequisite: KNES600, KNES601, and KNES602.
Repeatable to: 4 credits.
Credit Only Granted for: KNES778 or KNES785.

KNES785 Internship in Physical Activity and Public Health (3 Credits)
The internship is a time-limited, supervised period of public/community health activities carried out in a health or allied health organization involved with physical activity. Students gain practical experience in areas such as program planning and implementation, program evaluation, public policy analysis, research, and management.
Prerequisite: EPIB610, EPIB650, HLSA601, HLTH665, KNES600, KNES601, and MIEH600.
Recommended: KNES602.
Credit Only Granted for: KNES778 or KNES785.

KNES786 Capstone Project in Physical Activity and Public Health (3 Credits)
The culminating experience in which the student applies knowledge and skills learned in the MPH program to conduct independent work on a physical activity problem under the supervision of a faculty advisor.
Prerequisite: KNES600, KNES601, and KNES602.

KNES789 Advanced Projects in Kinesiology (1-3 Credits)
Advanced projects examining current problems and trends in kinesiology.
Repeatable to: 3 credits.

KNES798 Internship in Physical Education/Sports Management (1-8 Credits)
Practical application of previously acquired skills and knowledge in a sport and/or physical education setting. Emphasis on selected experiences to enhance the total academic program of the student. The internship site assignment will depend upon student's background and career goals.
Prerequisite: Permission of SPHL-Kinesiology department.
Repeatable to: 8 credits.

KNES799 Master's Thesis Research (1-6 Credits)

KNES898 Pre-Candidacy Research (1-8 Credits)

KNES899 Doctoral Dissertation Research (1-8 Credits)

KORA - Korean

KORA499 Independent Study Korean (1-3 Credits)
Independent study under faculty supervision.
Prerequisite: Permission of instructor.
Repeatable to: 6 credits if content differs.

LARC - Landscape Architecture

LARC420 Professional Practice (3 Credits)
An introduction to and comparative study of the professional concerns of design firms. Focus on planning, legal, ethical, marketing and management considerations of interdisciplinary practices.
Prerequisite: LARC321.
Restriction: Must be in Landscape Architecture program.

LARC440 Urban Studio Design (5 Credits)
The landscape architect's role within the interdisciplinary urban design process, focusing on urban site design issues. Pedestrian friendly site design and the future of sustainable development will be studied.
Prerequisite: LARC321; and LARC340; and LARC341.
Restriction: Must be in Landscape Architecture program.

LARC450 Environmental Resources (3 Credits)
A review of ecosystems and an examination of planning strategies for preservation, conservation, management and development of sensitive natural and cultural landscape resources in the mid-Atlantic region.
Prerequisite: ENST200; or permission of AGNR-Plant Science & Landscape Architecture department.

LARC451 Sustainable Communities (3 Credits)
Explores concepts, strategies and examples of community design which address the needs of a growing population while preserving the environment and its resources.

LARC452 Green Infrastructure and Community Greening (3 Credits)
A critical look and exploration of green infrastructure (GI) elements in the built environment in contributing to ecosystems services and the sustainability of the built environment. The course explores the science, issues, challenges, and the policy, planning and design solutions offered by green infrastructure.
Prerequisite: PLSC100 or PLSC101; or permission of instructor.
Restriction: Junior standing or higher.
Credit Only Granted for: LARC489G or LARC452.
Formerly: LARC489G.

LARC461 People and the Environment (3 Credits)
Focus is placed on human and environmental interactions. Students will look at both natural and built environments and how they influence human health and well-being. Many environmental settings will be examined. These include hospitals, public housing neighborhoods, school settings, retirement communities, transportation corridors and green spaces. We will also explore how racial and socio-economic factors affect living and working environmental conditions. Ultimately, students will be using this knowledge to create environments that support individuals, families and various community groups' health and well-being.
Repeatable to: 3 credits if content differs.
Credit Only Granted for: LARC489K or LARC461.
Formerly: LARC489K.

LARC470 Landscape Architecture Seminar (3 Credits)
A combination of self-directed study, seminar, and lecture formats. An introduction to aspects of research methods, critical analysis, and proposal writing with a focus on urban and community design.
Prerequisite: LARC321; and LARC341.
Corequisite: LARC440.
Restriction: Senior standing; and must be in Landscape Architecture program.

LARC471 Capstone Studio: Community Design (5 Credits)
A capstone experience that emphasizes the integration of critical thinking skills and methodologies introduced throughout the landscape architecture curriculum. Students apply design and analysis methodologies, evaluate alternative solutions, involve community residents and engage in final design development, using the master plan and site design process, report writing, and oral and graphic presentations. Final presentations are open to the university and the community.
Prerequisite: LARC440; and LARC470.
Restriction: Senior standing; and must be in Landscape Architecture program.

LARC489 Special Topics in Landscape Architecture (1-4 Credits)
Credit according to time scheduled and organization of course. A lecture and/or studio course organized as an in-depth study of a selected specialization of landscape architecture not covered by existing courses.
Prerequisite: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 4 credits if content differs.

LARC499 Independent Studies in Landscape Architecture (1-4 Credits)
Independent studies in landscape architecture including field, studio or library research under the direction of a faculty member.
Prerequisite: 12 credits in LARC courses; or permission of AGNR-Plant Science & Landscape Architecture department.
Restriction: Must be in Landscape Architecture program; or must be in Plant Sciences program.
Repeatable to: 4 credits if content differs.

LARC620 Graphic Tools for Landscape Representation (3 Credits)
This course integrates digital and analog methods of communication and provides an introduction to computer tools and techniques commonly used in landscape architecture practice. Non-drafting computer tools will be used to orient basic digital image capture, manipulation, and presentation formatting. Also includes techniques and application of various media for graphic communication associated with landscape architecture.
Corequisite: LARC640.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC621 Digital Drafting and Mapping (3 Credits)
The development and application of computing tools as used by the landscape architecture profession. Computer-Aided Design and Drafting (CADD) develops computer drafting skills using a variety of software programs. It also introduces students to Geographic Information Systems (GIS) mapping technologies, computational representations and modeling of landscape processes and solution methods for problems involving the special arrangement of land use activities.
Prerequisite: LARC620; or permission of AGNR-Plant Science & Landscape Architecture department.

LARC640 Graduate Studio I (5 Credits)
Principles and techniques of design as applied to shaping the landscape; developing concepts in visual thinking, environmental awareness, and design intervention through studio exercises and projects.
Corequisite: LARC620.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC641 Graduate Studio II (5 Credits)
Principles and techniques of site analysis, environmental design and site development for human settlements and interaction with natural systems. Will expand analytical skills through complex site design problems. Students will research, observe and apply low impact development and sustainable practices, become familiar with building and landscape types by investigating alternative arrangements on the land, and understand user needs and design for populations with a range of abilities. Will support LEED and sustainable practices and acknowledge the requirements of public health, safety, and welfare.
Prerequisite: LARC640.
Corequisite: LARC720.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC642 Graduate Studio III (5 Credits)
A focus on the interaction of landscape science (hydrology, geology, etc.) with the necessities and mechanisms of human settlements (transportation, economics, etc.) emphasizing innovative and forward thinking solutions to urbanization and ecological problems. It will apply this knowledge to landscape analysis, recreational planning and design, and community development, emphasizing resource management, spatial organization, landscape character, and the physical and social structure of community services. This course will be required for both Trach 1 and Track 2 students.
Prerequisite: LARC641.
Corequisite: LARC670.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC648 Graduate Studio IV (5 Credits)
An exploration that will focus on issues in landscape planning and design such as campus planning, urban housing and recreation, and neighborhood preservation, restoration and development. Projects will emphasize the value of responsible academic and civic landscapes, the place of historic resources in contemporary life, and innovative solutions for the integration of past and future landscapes.
Prerequisite: LARC721 and LARC642.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 6 credits if content differs.

LARC663 Landscape and Garden History (3 Credits)
History of garden making and its evolution into design practice. Students will become familiar with narratives of garden art and landscape architecture through the study of selected key sites, designers, and visual written sources. A focus on gardens' past and afterlife; the nature of primary sources (both built and written), and how these can be evaluated and used. Primary sources will be drawn from several disciplines and include a wide array of genres: treatises, epistolary exchanges, tax returns, novels, poems, paintings and drawings.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC670 Landscape Architecture Theory and Criticism (3 Credits)
Review and analysis of the body of literature concerning landscape architecture and relationships between humans and both natural and designed environments. Topics may include: rationalism, ethics, aesthetics, social and economic values, postmodernism, feminist, multiculturalism, ecological determinism, preservation/conservation, and sustainability and ecological design. Each week students will lead a debate and discussion on a theoretical issue based on the assigned readings for that week.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC671 Landscape Architecture Research Methods (3 Credits)
Investigation and discussion of broad scope of research methods and the development of landscape design and planning research techniques and skills. The urban environment will be viewed primarily as a social and psychological environment, with concern for who uses these environments and the conflicts that can arise between user groups.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC699 Independent Studies in Landscape and Architecture (1-3 Credits)
Individual Instruction course.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

LARC720 Environmental Analysis and Site Engineering (3 Credits)
Techniques for prediction of alterations in social and natural processes brought about by human use of the land; application of such assessments to environmental management; basic methods of landscape alteration, augmentation, and control including grading, drainage, road and trail design, and stormwater management.
Prerequisite: LARC640; or permission of AGNR-Plant Science & Landscape Architecture department.
Corequisite: LARC641.

LARC721 Landscape Construction Methods and Materials (3 Credits)
Basic methods of constructing landscapes and manipulating the appropriate plant and inorganic materials for the creation of ecologically sustainable environments for human use. An examination of the use, properties, and detailing of materials used in landscape construction.
Prerequisite: LARC720.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC748 Advanced Special Topics Studio (5 Credits)
Advanced special topics comprehensive landscape architecture studio-exploration will focus on cultural, behavioral and ecological issues in the physical planning and design of urban landscapes.
Prerequisite: LARC648 and LARC671.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 10 credits if content differs.

LARC799 Master's Thesis Research (1-6 Credits)
Development of a terminal thesis on a problem in landscape architecture, designed to demonstrate comprehensive skills and knowledge achieved in the graduate program. The subject will be selected in consultation with an advisor and periodically reviewed with a committee headed by the advisor.
Prerequisite: LARC748.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 12 credits if content differs.

LASC - Certificate in Latin American Studies

LASC448 Special Topics in Latin American Studies (3 Credits)
Intensive study of a selected topic related to Latin American Studies.
Restriction: Junior standing or higher.
Repeatable to: 6 credits if content differs.

LASC458 Senior Capstone Course in Latin American Studies (3 Credits)
Capstone course for advanced students in the Latin American Studies Certificate Program or other students with appropriate preparation. Interdisciplinary topics will vary each semester.
Prerequisite: LASC234 and LASC235; or permission of ARHU-School of Languages, Literatures, and Cultures department.
Restriction: Must be in Latin American Studies Certificate program; and senior standing.

LASC486 Internship in Latin American/Caribbean Studies (1-6 Credits)
Internship experience with an organization that works with or studies Latin American and/or the Caribbean. This is an experiential learning course that provides semester-long training that enriches the student's academic field of study and the LASC Certificate. Students submit a final written report of their experience, including critical analysis of the institutional relevance to their major field of study and to Latin American Studies. Students will also be asked to give an oral presentation.
Prerequisite: Student must have completed at least two LASC courses, one of which must be a required/core course (LASC/SPAN234, LASC/SPAN235, LASC/HIST250, or LASC/HIST251); and permission of Latin American Studies Center required.
Restriction: Minimum cumulative GPA of 2.5; and must have earned a minimum of 60 credits.
Additional Information: The course is primarily intended for students seeking the Certificate in Latin American Studies, but exceptions will be considered for students with educational or career interests which lie in this area. Student internships must be approved by the Director, and students must secure an appropriate faculty mentor for the internship course. An internship course will be approved only if a faculty supervisor is available.

LASC499 Independent Study in Latin American Studies (1-3 Credits)
Independent Study in Latin American Studies.
Restriction: Permission of instructor.

LASC648 Special Topics in Latin American Studies (1-3 Credits)
Intensive study of a selected topic related to Latin America, the Caribbean, or Latina/o Studies.
Repeatable to: 9 credits if content differs.

LATN - Latin

LATN403 Roman Satire (3 Credits)
Readings are in Latin.

LATN405 Lucretius (3 Credits)
Readings are in Latin.

LATN410 Latin Historians (3 Credits)
Latin historical writing as a literary genre. Influences, style, and literary techniques. Readings are in Latin.

LATN415 Vergil's Aeneid (3 Credits)
Vergil's Aeneid: readings of selections in Latin and of the entire epic in English translation along with critical essays.
Formerly: LATN305.

LATN420 Cicero and Caesar (3 Credits)
Reading and analysis of texts by M. Tullius Cicero and C. Iulius Caesar, with emphasis on the relationships between them and on the period of the Civil War. Readings are in Latin.

LATN424 Silver Age Latin (3 Credits)
Reading and analysis of selected texts. Emphasis on the role of Nero and Seneca in literary developments. Readings are in Latin.

LATN472 Historical Development of the Latin Language (3 Credits)
An analysis of the development of the Latin language from archaic times to the Middle Ages.
Credit Only Granted for: LATN472 or LING431.

LATN488 Latin Readings (3 Credits)
The reading of one or more selected Latin authors from antiquity through the Renaissance. Reports.
Prerequisite: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.
Additional Information: Readings are in Latin.

LATN499 Independent Study in Latin Language and Literature (1-3 Credits)

LATN604 Cicero (3 Credits)
A study of Cicero's contributions to Roman literature and culture. Readings from the speeches, letters, and/or philosophical and rhetorical works. The development of Cicero's style, his philosophy, and his attitudes toward the changing political scene between 82 and 43 B.C.

LATN605 Vergil (3 Credits)
A study of Vergil's development as a literary artist and Augustan poet through readings in the Eclogues, Georgics, and Aeneid.

LATN620 Archaic Latin (3 Credits)
An investigation of both the evolving Latin language and the emerging literary genres of the late third and second centuries B.C.

LATN623 The Augustan Age (3 Credits)
Analysis of the major literary figures and genres in prose and poetry of the period from 43 BC to AD 14.

LATN624 Silver Age Latin (3 Credits)
An investigation of both the evolving Latin language and the major literary figures and genres in prose and poetry of the period from A.D. 14 through the mid-second century.

LATN630 Latin Literature of the Late Empire (3 Credits)
An examination of Latin literary texts from the third to the fifth centuries A.D., Christian as well as pagan.

LATN631 Medieval Latin (3 Credits)
An examination of literary documentary texts in Latin from the end of the Roman Empire to the Renaissance.

LATN672 Historical Development of the Latin Language (3 Credits)
An analysis of the development of the Latin language from the archaic period to the Middle Ages.

LATN688 Special Topics in Latin Literature (3 Credits)

LATN699 Independent Studies in Latin Literature (1-3 Credits)

LATN799 Master's Thesis Research (1-6 Credits)

LBSC - Library Science

LBSC499 Workshops, Clinics, and Institutes (1-9 Credits)
Workshops, clinics, and institutes developed around specific topics or problems. Primarily for practicing librarians.
Repeatable to: 9 credits.

LBSC602 Serving Information Needs (3 Credits)
An introduction to the skills necessary to interact directly with individuals through the exploration of user behavior theory, strategies to locate and evaluate information from print and electronic resources, and policies and procedures to ensure that all individuals can become information literate.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC602, or both LBSC601 and LBSC650.

LBSC611 History of the Book (3 Credits)
Introduction to the history and development of the book from pre-printing and incunabula to the post-modern book. Book illustration; publishing; collecting.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC611 or LBSC078B.
Formerly: LBSC708B.

LBSC631 Achieving Organizational Excellence (3 Credits)
Overview of the principles, practices, and techniques required for effective leadership and management. The innovative strategies, management responsibilities, and skills needed to achieve and sustain high organizational performance in information-based cultural institutions.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC631 or LBSC635.

LBSC641 Selecting and Evaluating of Resources for Learning (3 Credits)
Policies and procedures for collection development, including identifying, evaluating, acquiring, providing, and promoting resources in all formats, to support learning and teaching in elementary and secondary schools.
Restriction: Permission of INFO-College of Information Studies.

LBSC644 Collection Development (3 Credits)
Activities through which library collections are systematically developed and managed are explored, especially the formulation and implementation of written collection development policies. Other specific topics include identification of user needs; collection evaluation; fund allocation among competing departments, subjects, and/or media; selection methods; intellectual freedom; storage alternatives; and cooperative collection development.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC 644 or LBSC 708G.
Formerly: LBSC 708G.

LBSC645 Literature and Materials for Children (3 Credits)
Survey of literature and other materials for children and youth. Criteria for evaluating and using such materials as they relate to the needs, interests, reading abilities, and other capabilities of young readers.
Restriction: Permission of INFO-College of Information Studies.

LBSC646 Literature and Materials for Young Adults (3 Credits)
Survey of literature and other materials for older children and adolescents. Criteria for evaluating and using such materials as they relate to the needs, interests, reading abilities, and other capabilities of young readers.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC646 or LBSC746.
Formerly: LBSC746.

LBSC647 Children's Services in the Public Library (3 Credits)
Public library services for children, birth to 12 years of age. Developmental characteristics and information needs of children. Children as a client group. Programming and collection development. Management of children's services, including planning, staffing, and advocacy.
Restriction: Permission of INFO-College of Information Studies.

LBSC671 Creating Information Infrastructures (3 Credits)
Foundations of acquiring and managing collections, information structures, indexing and discovery systems needed by information professionals. An introduction to the theoretical concepts, trends, systems, and technologies central to the information field.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC671, or LBSC670 and LBSC690.

LBSC702 User Instruction (3 Credits)
Critical analysis of the rationale, content, and processes of user instruction in library and information settings.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC703 Field Study in Archives and Digital Curation (3 Credits)
Supervised internship experience in archives or digital curation programs in organizations and institutions.
Prerequisite: LBSC602, LBSC631, and LBSC671; and must have completed 9 additional credits. Or permission of instructor.
Restriction: Must be in Library and Information Science (Master's) program; and permission of INFO-College of Information Studies.

LBSC706 Seminar in International and Comparative Librarianship and Information Science (3 Credits)
Comparison and contrast of bibliographic systems, institutions, service arrangements, and professional patterns in developed and developing cultures. Libraries, information organizations, and international information systems viewed against the backdrop of national cultures. Influences of social, political, and economic factors upon these forms.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC707 Field Study in Information Service (3 Credits)
Supervised internship experience in a library, archive, museum, or other information organization.
Prerequisite: LBSC602, LBSC671, and LBSC631; and must have completed an additional 9 credits. Or permission of instructor.
Restriction: Must be in Library and Information Science (Master's) program; and permission of INFO-College of Information Studies.

LBSC708 Special Topics in Library and Information Science (1-3 Credits)
A special topics course with content determined by individual instructors. For questions about the content of the course contact the College of Information Studies.
Restriction: Permission of INFO-College of Information Studies.
Repeatable to: 9 credits if content differs.
Additional Information: No student may earn more than a total of 12 credits (combined) in LBSC 708 and LBSC 709.

LBSC709 Independent Study (1-3 Credits)
Intensive individual study, reading, or research in an area of specialized interest under faculty supervision.
Restriction: Permission of instructor; and permission of INFO-College of Information Studies.
Repeatable to: 9 credits.

LBSC713 Planning and Evaluating Library and Information Services (3 Credits)
An investigation of quantitative and qualitative methods used to plan and evaluate the effectiveness of library and information services. Planning and evaluation methodologies will be analyzed and critiqued. Selected methods will be demonstrated and/or utilized.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC723 Advocacy and Support for Information Services (3 Credits)
Role and influence of government, foundations, associations, and other organizations in supporting and setting the agenda for information services of all types. Role of information professionals in demonstrating advocacy, fund-raising, public relations, lobbying, and seeking external support.
Restriction: Permission of INFO-College of Information Studies.

LBSC724 Public Library Seminar (3 Credits)
Organization, support, and service patterns of public libraries. The public library in national, state, and local contexts.
Prerequisite: Permission of INFO-College of Information Studies.

LBSC731 Special Collections (3 Credits)
Management of special collections, whose holdings may include manuscripts (particularly personal papers), non-textual materials, graphical materials, and rare books, with analysis of the custodial and management functions associated with special collections.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC734 Seminar in the Academic Library (3 Credits)
Role of the academic library within the framework of higher education. Planning programs and services, collections, support, fiscal management, physical plant, and cooperation.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC737 Seminar in the Special Library and Information Center (3 Credits)
Role of special libraries and information centers in the information transfer process. Analysis of the information transfer system; information needs and uses; management of special libraries and information centers; and types of libraries, such as governmental or industrial libraries, archives, and information analysis centers.
Prerequisite: LBSC601, LBSC690, LBSC670, and LBSC650; or (LBSC602, LBSC631, and LBSC671); or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC741 Seminar in School Library Administration (3 Credits)
Development, management, and evaluation of school library programs at all levels.
Prerequisite: INST650; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC742 Collaborative Instructional Design and Evaluation (3 Credits)
School librarians' collaborative role in instruction. Systematic design, development, and evaluation of instructional strategies and products for learning.
Prerequisite: INST650; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC744 Internship in School Libraries (3 Credits)
Opportunities to observe and participate in the operation of school libraries at the elementary and secondary levels under the supervision of certified school librarians. Required of all School Library Media certification candidates.
Prerequisite: INST650, LBSC641, INST651, and LBSC741; or permission of instructor.
Restriction: Permission of instructor; and permission of INFO-College of Information Studies.

LBSC745 Storytelling Materials and Techniques (3 Credits)
Literary sources and instruction and practice in oral techniques.
Prerequisite: LBSC645; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC748 Advanced Seminar in Children's Literature (3 Credits)
Selected topics in literature for children and adolescents, including historical aspects, individual authors, and major themes and trends.
Prerequisite: LBSC645; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC753 Information Access in the Social Sciences (3 Credits)
Research methods, information needs, information structure, and information sources and services in the social sciences (for example, anthropology, economics, education, geography, history, political science, psychology, sociology).
Prerequisite: LBSC650 or LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC770 Metadata and Tools for Information Professionals (3 Credits)
Principles, standards, and practices of information representation to facilitate accessing needed information in digital bibliographic environments. Includes exposure to Metadata, XML, RDA/AACR2R, DTDs, MARC, Dublin Core, MODS, ISBN and ISSN, FRBR, FRAD, Classification systems, and Controlled Vocabularies such as LCSH, SEARS, NLM, Getty and ERIC Thesauri, and others.
Prerequisite: LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC773 Classification Theory (3 Credits)
Survey of classificatory principles from bibliographic, philosophical, biological, psychological, and linguistic perspectives. Challenges to traditional principles from the cognitive sciences and their implementations for bibliographic classification.
Prerequisite: LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC774 Seminar in Linguistic Topics (3 Credits)
Topics in linguistics with applications in information science. Syntax and semantics as they apply to the analysis of communication processes and to natural language processing for information storage and retrieval.
Prerequisite: LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC775 Indexing, Abstracting and Thesaurus Construction (3 Credits)
Fundamentals of indexing, abstracting, and thesaurus construction in theory and practice, including: the formation of vocabularies; construction of a thesaurus; systems of indexing; effects of systems upon information retrieval; style and format of abstracts; evaluation of abstracting services; and requirements of users of abstracts. The design and construction of index languages/thesauri and analysis and evaluation of existing index languages/thesauri. Discussion of currently available indexing software packages.
Prerequisite: LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC781 Access Techniques and Systems for Archives (3 Credits)
Methods, approaches, and systems to locate, access, and use archival records, including systems analysis, control systems. researcher services, descriptive formats and techniques, and the use of digital technologies and the Internet for accessing archival records.
Prerequisite: Permission of INFO-College of Information Studies; and LBSC605.

LBSC786 Library and Archives Preservation (3 Credits)
An introduction to library and archives materials and media, the risks that affect their preservation and strategies used to enhance preservation of library and archives collections. The course reviews preservation knowledge and skills that archival and library staff uses when providing access, managing, processing and working with collections.
Prerequisite: INST604; and permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC789 Special Topics in Contemporary Archives (3 Credits)
Issues in administering contemporary archives and records management programs. Topics are selected by individual instructors. For course content information please contact the College of Information Studies.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC791 Designing Principled Inquiry (3 Credits)
Critical analysis of roles of information professions and institutions in integrating theory, methods, practice, policies, and values of the field, and applying them to the design of future information systems and services.
Prerequisite: LBSC671, LBSC602, and LBSC631; and additional 9 credits of coursework applied to the MLIS degree. Or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC799 Master's Thesis Research (1-6 Credits)
Intensive research conducted under the supervision of a faculty member.
Prerequisite: INST701; and permission of instructor.
Restriction: Must be in Library and Information Science (Master's) program; and permission of instructor; and permission of INFO-College of Information Studies.
Repeatable to: 9 credits.

LGBT - Lesbian Gay Bisexual Transgender Studies

LGBT448 Special Topics in Lesbian, Gay, Bisexual, and Transgender Studies (3 Credits)
In-depth study of particular themes and issues in LGBT studies.
Prerequisite: LGBT200; or permission of LGBT Studies Program.
Restriction: Junior standing or higher.
Repeatable to: 9 credits if content differs.

LGBT459 Selected Topics in Sexuality and Literature (3 Credits)
Detailed study of sexuality as an aspect of literary and cultural expression.
Prerequisite: Must have completed two lower-level English courses, at least one in literature.
Repeatable to: 9 credits if content differs. Also offered as: ENGL459.

LGBT465 Theories of Sexuality and Literature (3 Credits)
An in-depth study of the ways in which sexuality and sexual difference create or confound the conditions of meaning in the production of literary texts. Attention to psychoanalysis, history of sexuality, feminist theory, and other accounts of sexual identity.
Prerequisite: Must have completed two lower-level English courses, at least one in literature.
Restriction: Must not have completed ENGL465. Also offered as: ENGL465.
Credit Only Granted for: ENGL465 or LGBT465.

LGBT488 Seminar in Lesbian, Gay, Bisexual, and Transgender Studies (1-3 Credits)
Developments in theories and methods of LGBT Studies, with emphasis upon interaction between the humanities and the social sciences in the elaboration of this interdisciplinary area of scholarship.
Prerequisite: 9 credits in LGBT courses; and permission of LGBT Studies Program.
Recommended: LGBT200. And ENGL265; or CMLT291.
Repeatable to: 9 credits if content differs.
Formerly: CMLT498Y.

LGBT494 Lesbian Communities and Differences (3 Credits)
The meanings of lesbian communities across many lines of difference. Using lesbian-feminists of the 1970s as a starting point, we will look both back and forward in history, tracing changes and exploring the meanings of these in their social and historical contexts.
Prerequisite: Must have completed one course in Women's Studies, preferably WMST200 or WMST250. Also offered as: WMST494.
Credit Only Granted for: LGBT494 or WMST494.

LGBT499 Independent Study (1-3 Credits)
Directed research and analysis in LGBT Studies on a topic selected by the student.
Prerequisite: LGBT200; and permission of LGBT Studies Program.
Restriction: Senior standing.
Repeatable to: 6 credits if content differs.

LING - Linguistics

LING410 Grammar and Meaning (3 Credits)
The basic notions of semantic theory: reference, quantification, scope relations, compositionality, thematic relations, tense and time, etc. The role these notions play in grammars of natural languages. Properties of logical form and relationship with syntax.
Prerequisite: Permission of instructor; or LING311.

LING411 Comparative Syntax (3 Credits)
Comparison of data from a variety of languages with respect to syntactic theory in order to investigate how parameters of universal grammar are fixed differently in different languages. Attempts to work out fragments of grammars for some languages.
Prerequisite: LING312; or permission of instructor.

LING419 Topics in Syntax (3 Credits)
Topics vary.
Prerequisite: LING311.
Repeatable to: 12 credits if content differs.

LING420 Word Formation (3 Credits)
Examination of shape and meaning of possible words, both across languages and within particular languages. Interaction between principles of word formation and other components of a grammar: syntax, logical form and phonology.
Prerequisite: LING321 and LING311.

LING429 Topics in Phonology (3 Credits)
Advanced seminar in phonology. Topics vary.
Prerequisite: LING322.
Repeatable to: 6 credits if content differs.

LING439 Topics in Diachronic Linguistics (3 Credits)

LING440 Grammars and Cognition (3 Credits)
Relationship between the structure, development and functioning of grammars and the structure, development and functioning of other mental systems. Interpretations of experimental and observational work on children's language, aphasia, speech production and comprehension.
Prerequisite: LING321 and LING311.

LING444 Child Language Acquisition (3 Credits)
Examines language acquisition in infancy and early childhood: the nature of children's linguistic representations and how these develop naturally. Role of (possible) innate linguistic structure and interaction of such structure with experience. Evaluation of methods and results of current and classic research leading to contemporary models of language development.
Prerequisite: LING311.

LING448 Advanced Laboratory Research in Linguistics (2-3 Credits)
Individualized, collaborative research course aimed at developing skills for laboratory research in language acquisition, sentence processing or neurolinguistics. Conducting a research project in laboratory linguistics as part of a team creating original research relevant to current issues in linguistics.
Prerequisite: LING248; and (LING200 or LING240).
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.
Additional Information: This course is part of a two-semester sequence. Ling248 is a prerequisite. Ling248 and Ling448 must be completed in the same laboratory.

LING449 Topics in Psycholinguistics (3 Credits)
Critical evaluation of primary research in psycholinguistics. Relating theoretical hypotheses to experimental hypotheses and predictions. Evaluation of experimental results. Emphasis on hands-on experience and experimental methodologies. Specific topics vary.
Prerequisite: LING321 and LING311; or permission of ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.

LING451 Grammars and Variation (3 Credits)
Grammars and the use of language in a variety of styles: formal, casual, literary, etc. Consequences for concepts of grammars. Variation theory. Literary styles.
Prerequisite: LING311.

LING453 Mathematical Approaches to Language (3 Credits)
The aspects of mathematics used in linguistic discussions: recursion theory, Chomsky's hierarchy of grammars, set theory, Boolean algebra, finite state grammars, context-free grammars, etc. Applications to theories of grammars. Formalizations of grammatical theories.
Prerequisite: LING312.

LING455 Second Language Acquisition (3 Credits)
Examines second language acquisition from the perspective of Chomsky's 'Universal Grammar'. Relationship between theories of grammars, first language acquisition by children and the learning of second languages by adults.
Prerequisite: LING311.

LING460 Diversity and Unity in Human Languages (3 Credits)
Fundamentals of grammatical typology as they relate to issues in social attitudes towards language. Linguistic structure of standard and non-standard languages and dialects. Relationship of different writing systems to linguistic structure. Issues in bilingualism and multilingualism.
Prerequisite: LING240 or LING200.

LING487 Computer Science for Cognitive Studies (3 Credits)
List processing and discrete mathematics. Preparation for the study of artificial intelligence and other mathematically oriented branches of cognitive studies. Intended for students of linguistics, philosophy, and psychology. LISP computer language, graphs and trees, the concept of computational complexity, search algorithms.
Credit Only Granted for: LING487 or PHIL487.

LING499 Directed Studies in Linguistics (1-3 Credits)
Independent study or research on language under the supervision of a faculty member.
Prerequisite: Permission of ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.

LING610 Syntactic Theory (3 Credits)
Intensive introduction to transformational syntax.
Prerequisite: LING312.

LING611 Issues in Syntax (3 Credits)
Topics of current theoretical interest examined through data from a variety of languages.
Prerequisite: LING610.

LING620 Phonological Theory (3 Credits)
Topics in current phonological theory, as they relate to data from various languages. Segmental and prosodic analysis. Autosegmental theory, metrical theory, etc.
Prerequisite: LING322.

LING621 Issues in Phonology (3 Credits)
Topics of current interest in phonological theory examined through data from several languages.
Prerequisite: LING620.

LING625 Morphology and the Lexicon (3 Credits)
The structure of words and investigation of how word formation processes interact with other components of grammar.

LING640 Psycholinguistics (3 Credits)
Core graduate course in psycholinguistics, covering leading theoretical approaches and experimental methods in language acquisition, language processing, and neurolinguistics.
Restriction: Permission of instructor.

LING641 Issues in Psycholinguistics (3 Credits)
Topics of current interest in psycholinguistics, including both theoretical approaches and experimental and analytical issues in language acquisition, language processing, and neurolinguistics.
Prerequisite: LING640.

LING644 Language Acquisition (3 Credits)
Interpretations of observational and experimental work on children's language development, and relationship between developmental stages and theories of human language faculties.
Prerequisite: LING640.

LING646 Cognitive Neuroscience of Language (3 Credits)
Overview of classical and recent work on the neural basis of speech and language, with a goal of introducing contemporary methods and results to prepare the student to read the neurolinguistics and cognitive neuroscience literature. An emphasis will be placed on current techniques.

LING658 History of a Language (3 Credits)
Detailed examination of the history of a single language or language family.
Repeatable to: 6 credits if content differs.

LING659 Structure of a Language (3 Credits)
Detailed examination of a particular language or language family.
Repeatable to: 6 credits if content differs.

LING660 Introduction to Semantics (3 Credits)
Basic concepts and methods of contemporary semantic theory including basic set theory, elementary propositional and predicate calculus, the structure of predicates and propositions, quantification binding. Prepares students for study of more advanced topics in semantics.
Restriction: Permission of instructor.

LING661 Issues in Semantics (3 Credits)
A second course in semantic theory. Application of basic concepts and methods to topics of current theoretical interest.
Prerequisite: LING660; or permission of ARHU-Linguistics department.

LING663 Pragmatics (3 Credits)
An intensive introduction to formal linguistic pragmatics: the study of systematic dependencies of meaning on context of use. Topics will include implicature, presupposition, reference, topic, focus, and the linguistic means of expressing these.
Prerequisite: LING660 or PHIL660; or permission of instructor.
Recommended: LING661.

LING678 Linguistic Field Methods (3 Credits)
A hands-on introduction to conducting linguistic analysis on an unfamiliar language. Students work with a native speaker of a language that they are not familiar with, devising elicitations and developing analyses. Investigations will include phonological, morphological, syntactic, and semantic properties of the language.
Prerequisite: Minimum grade of B- in LING311 and LING321.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

LING689 Independent Study (1-3 Credits)
Independent studies in grammatical theory.
Restriction: Permission of instructor; and must be in a major within ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.

LING698 Directed Study (1-3 Credits)

LING723 Computational Linguistics I (3 Credits)
Fundamental methods in natural language processing. Topics include: finite-state methods, context-free and extended context-free models of syntax; parsing and semantic interpretation; n-gram and Hidden Markov models, part-of-speech tagging; natural language applications such as machine translation, automatic summarization, and question answering.
Prerequisite: CMSC421; or students who have taken courses with comparable content may contact the department; or permission of instructor. Also offered as: CMSC723, INST735.
Credit Only Granted for: CMSC723, LING723, or INST735.
Formerly: LING645.

LING773 Computational Linguistics II (3 Credits)
Natural language processing with a focus on corpus-based statistical techniques. Topics include: stochastic language modeling, smoothing, noisy channel models, probabilistic grammars and parsing; lexical acquisition, similarity-based methods, word sense disambiguation, statistical methods in NLP applications; system evaluation.
Prerequisite: LING723 or CMSC723; or permission of instructor. Also offered as: CMSC773.
Formerly: LING647.

LING798 Research Papers in Linguistics (1-6 Credits)

LING799 Master's Thesis Research (1-6 Credits)

LING819 Seminar in Syntactic Theory (3 Credits)
Current topics in research on syntactic theory.
Prerequisite: LING611.
Repeatable to: 6 credits if content differs.

LING829 Seminar in Phonological Theory (3 Credits)
Current topics in research on phonology and morphology.
Prerequisite: LING621.
Repeatable to: 6 credits if content differs.

LING839 Seminar in Language Change (3 Credits)
Topics in research on historical change in language.
Prerequisite: LING630.
Repeatable to: 6 credits if content differs.

LING848 Seminar in Computational Linguistics (3 Credits)
Current topics in research in computational linguistics.
Prerequisite: LING645; or permission of instructor.

LING849 Seminar in Psycholinguistics (3 Credits)
Current topics in research on psycholinguistics.
Prerequisite: LING640 or LING641; or permission of instructor.
Repeatable to: 6 credits if content differs.

LING859 Seminar in Language Acquisition (3 Credits)
Current topics in research on language acquisition.
Prerequisite: LING640 or LING641; or permission of ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: LING859 or LING889A.
Formerly: LING889A.

LING869 Seminar in Neurolinguistics (3 Credits)
Current topics in research on neurolinguistics.
Prerequisite: LING640 or LING641; or permission of ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: LING869 or LING889A.
Formerly: LING889A.

LING879 Seminar in Semantics (3 Credits)
Current topics in research in semantics.
Prerequisite: LING660 or LING661.
Repeatable to: 9 credits if content differs.
Formerly: LING889.

LING888 Doctoral Research Paper (1-6 Credits)
Students will strengthen their abilities to formulate coherent research questions, conduct research and create a publishable piece of work. In addition, the course is part of a set of requirements to advance to doctoral candidacy.
Repeatable to: 6 credits.
Credit Only Granted for: LING888 or LING895.
Formerly: LING895.

LING889 Directed Research (1-8 Credits)

LING896 Research Paper in Minor Area (3 Credits)
This course is designed to strengthen the students' ability to do research in a minor area of expertise, and to help them create a publishable piece. In addition, the course constitutes part of a set of requirements to advance to doctoral candidacy.
Prerequisite: LING888.

LING898 Pre-Candidacy Research (1-8 Credits)

LING899 Doctoral Dissertation Research (1-8 Credits)

MAIT - Masters in the Mathematics of Advanced Industrial Tech

MAIT623 Modern Mathematical Methods of Signal and Image Processing I (3 Credits)
Introduction to current signal/image processing techniques, including wavelets and frames, in the context of applied and numerical harmonic analysis. Topics include time-frequency and time-scale representations, sub-band filterbanks, and applications to compression and denoising.
Prerequisite: Must have knowledge of advanced calculus and applications.

MAIT626 Statistical Pattern Recognition and Classification (3 Credits)
Mathematical and statistical tools for decision making based on categorization of patterns present in data. Topics include regression, feature extraction, dimensionality reduction, parametric and non-parametric approaches to decision, estimation, and classification problems.

MAIT679 Special Topics in Mathematics of Advanced Industrial Technology (3 Credits)
Special topics courses are intended to expose students to the latest developments in mathematical applications. As such, the content will vary depending on the instructor and the current state-of-the-art. 679 will appear with a letter appended to distinguish different topics. New 679 courses will be added as areas of interest arise.

MAIT699 Independent Masters Project (1-3 Credits)
This course allows students to apply advanced mathematical methods to practical, real-world problems. Projects are supervised individually by faculty members from the MAIT Program. The project's nature is flexible and determined jointly by the student and supervisor. A detailed final report must be prepared by the student and approved by the supervisor.
Restriction: Permission of instructor.
Repeatable to: 12 credits if content differs.

MATH - Mathematics

MATH401 Applications of Linear Algebra (3 Credits)
Various applications of linear algebra: theory of finite games, linear programming, matrix methods as applied to finite Markov chains, random walk, incidence matrices, graphs and directed graphs, networks and transportation problems.
Prerequisite: 1 course with a minimum grade of C- from (MATH461, MATH240, MATH341).

MATH402 Algebraic Structures (3 Credits)
For students having only limited experience with rigorous mathematical proofs. Parallels MATH403. Students planning graduate work in mathematics should take MATH403. Groups, rings, integral domains and fields, detailed study of several groups; properties of integers and polynomials. Emphasis is on the origin of the mathematical ideas studied and the logical structure of the subject.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461).
Restriction: Must not be in any of the following programs (Mathematics (Master's); Mathematics (Doctoral)).
Credit Only Granted for: MATH402 or MATH403.

MATH403 Introduction to Abstract Algebra (3 Credits)
Integers; groups, rings, integral domains, fields.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH340); and 1 course with a minimum grade of C- from (MATH341, MATH241); and minimum grade of C- in MATH310. Or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: MATH402 or MATH403.

MATH404 Field Theory (3 Credits)
Algebraic and transcendental elements, Galois theory, constructions with straight-edge and compass, solutions of equations of low degrees, insolubility of the quintic equation, Sylow theorems, fundamental theorem of finite Abelian groups.
Prerequisite: Minimum grade of C- in MATH403.

MATH405 Linear Algebra (3 Credits)
An abstract treatment of finite dimensional vector spaces. Linear transformations and their invariants.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and minimum grade of C- in MATH310.

MATH406 Introduction to Number Theory (3 Credits)
Integers, divisibility, prime numbers, unique factorization, congruences, quadratic reciprocity, Diophantine equations and arithmetic functions.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH241, MATH246, MATH340, MATH341, MATH461); or permission of CMNS-Mathematics department.

MATH410 Advanced Calculus I (3 Credits)
First semester of a year course. Subjects covered during the year are: sequences and series of numbers, continuity and differentiability of real valued functions of one variable, the Riemann integral, sequences of functions and power series. Functions of several variables including partial derivatives, multiple integrals, line and surface integrals. The implicit function theorem.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241); and minimum grade of C- in MATH310. Or students who have taken courses with comparable content may contact the department.

MATH411 Advanced Calculus II (3 Credits)
Continuation of MATH410.
Prerequisite: Minimum grade of C- in MATH410; and permission of CMNS-Mathematics department.
Credit Only Granted for: MATH411 or MATH412.

MATH412 Advanced Calculus with Applications (3 Credits)
Analysis in several variables, and applications, from a computational perspective.
Prerequisite: Minimum grade of C- in MATH410; and permission of CMNS-Mathematics department.
Credit Only Granted for: MATH411 or MATH412.

MATH416 Applied Harmonic Analysis: An Introduction to Signal Processing (3 Credits)
Introduces students to the mathematical concepts arising in signal analysis from the applied harmonic analysis point of view. Topics include applied linear algebra, Fourier series, discrete Fourier transform, Fourier transform, Shannon Sampling Theorem, wavelet bases, multiresolution analysis, and discrete wavelet transform.
Prerequisite: Minimum grade of C- in MATH141; and 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and familiarity with MATLAB is required.

MATH420 Mathematical Modeling (3 Credits)
The course will develop skills in data-driven mathematical modeling through individual and group projects. Emphasis will be placed on both analytical and computational methods, and on effective oral and written presentation of results.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (MATH246, MATH341); and minimum grade of C- in STAT400. And 1 course with a minimum grade of C- from (CMSC106, CMSC131); or students who have taken courses with comparable content may contact the department. Also offered as: AMSC420.
Credit Only Granted for: AMSC420 or MATH420.

MATH424 Introduction to the Mathematics of Finance (3 Credits)
Introduction to the mathematical models used in finance and economics with emphasis on pricing derivative instruments. Designed for students in mathematics, computer science, engineering, finance and physics. Financial markets and instruments; elements from basic probability theory; interest rates and present value analysis; normal distribution of stock returns; option pricing; arbitrage pricing theory; the multiperiod binomial model; the Black-Scholes option pricing formula; proof of the Black-Scholes option pricing formula and applications; trading and hedging of options; Delta hedging; utility functions and portfolio theory; elementary stochastic calculus; Ito's Lemma; the Black-Scholes equation and its conversion to the heat equation.
Prerequisite: Minimum grade of C- in MATH141; and 1 course with a minimum grade of C- from (STAT400, STAT410); and permission of CMNS-Mathematics department.
Recommended: MATH246, MATH240, MATH241, MATH340, or MATH341.
Credit Only Granted for: BMGT444, MATH424.

MATH430 Euclidean and Non-Euclidean Geometries (3 Credits)
Hilbert's axioms for Euclidean geometry. Neutral geometry: the consistency of the hyperbolic parallel postulate and the inconsistency of the elliptic parallel postulate with neutral geometry. Models of hyperbolic geometry. Existence and properties of isometries.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461).

MATH431 Geometry for Computer Applications (3 Credits)
Topics from projective geometry and transformation geometry, emphasizing the two-dimensional representation of three-dimensional objects and objects moving about in the plane and space. The emphasis will be on formulas and algorithms of immediate use in computer graphics.
Prerequisite: 1 course with a minimum grade of C- from (MATH461, MATH240, MATH341).

MATH432 Introduction to Topology (3 Credits)
Metric spaces, topological spaces, connectedness, compactness (including Heine-Borel and Bolzano-Weierstrass theorems), Cantor sets, continuous maps and homeomorphisms, fundamental group (homotopy, covering spaces, the fundamental theorem of algebra, Brouwer fixed point theorem), surfaces (e.g., Euler characteristic, the index of a vector field, hairy sphere theorem), elements of combinatorial topology (graphs and trees, planarity, coloring problems).
Prerequisite: Minimum grade of C- in MATH410.

MATH436 Differential Geometry of Curves and Surfaces I (3 Credits)
Curves in the plane and Euclidean space, moving frames, surfaces in Euclidean space, orientability of surfaces; Gaussian and mean curvatures; surfaces of revolution, ruled surfaces, minimal surfaces, special curves on surfaces, "Theorema Egregium"; the intrinsic geometry of surfaces.
Prerequisite: MATH241 or MATH340; and (MATH461, MATH240, or MATH341); and must have completed two 400-level MATH courses (not including MATH461, 478, and 480's).

MATH437 Differential Forms (3 Credits)
Introduction to differential forms and their applications, and unites the fundamental theorems of multivariable calculus in a general Stokes Theorem that is valid in great generality. It develops this theory and technique to perform calculations in analysis and geometry. Topics include an introduction to topological spaces, the Gauss-Bonnet Theorem, Gauss's formula for the linking number, and the Cauchy Integral Theorem. Applications include Maxwell's equations of electromagnetism, connections and gauge theory, and symplectic geometry and Hamiltonian dynamics.
Prerequisite: 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461).
Recommended: MATH405, MATH403, MATH436, MATH410, or MATH432.

MATH445 Elementary Mathematical Logic (3 Credits)
Elementary development of propositional and predicate logic, including semantics and deductive systems and with a discussion of completeness, incompleteness and the decision problem.
Prerequisite: Minimum grade of C- in MATH141.

MATH446 Axiomatic Set Theory (3 Credits)
Development of a system of axiomatic set theory, choice principles, induction principles, ordinal arithmetic including discussion of cancellation laws, divisibility, canonical expansions, cardinal arithmetic including connections with the axiom of choice, Hartog's theorem, Konig's theorem, properties of regular, singular and inaccessible cardinals.
Prerequisite: 1 course with a minimum grade of C- from (MATH403, MATH410).

MATH452 Introduction to Dynamics and Chaos (3 Credits)
An introduction to mathematical dynamics and chaos. Orbits, bifurcations, Cantor sets and horseshoes, symbolic dynamics, fractal dimension, notions of stability, flows and chaos. Includes motivation and historical perspectives, as well as examples of fundamental maps studied in dynamics and applications of dynamics.
Prerequisite: Minimum grade of C- in MATH246; and 1 course with a minimum grade of C- from (MATH240, MATH461). Or minimum grade of C- in MATH340 and MATH341. Also offered as: AMSC452.
Credit Only Granted for: AMSC452 or MATH452.

MATH456 Cryptography (3 Credits)
The theory, application, and implementation of mathematical techniques used to secure modern communications. Topics include symmetric and public-key encryption, message integrity, hash functions, block-cipher design and analysis, number theory, and digital signatures.
Prerequisite: (CMSC106, CMSC131, or ENEE150; or equivalent programming experience); and (2 courses from (CMSC330, CMSC351, ENEE324, or ENEE380); or any one of these courses and a 400-level MATH course, or two 400-level MATH courses). Or permission of instructor. Also offered as: CMSC456, ENEE456.
Credit Only Granted for: MATH456, CMSC456 or ENEE456.

MATH461 Linear Algebra for Scientists and Engineers (3 Credits)
Basic concepts of linear algebra. This course is similar to MATH 240, but with more extensive coverage of the topics needed in applied linear algebra: change of basis, complex eigenvalues, diagonalization, the Jordan canonical form.
Prerequisite: Minimum grade of C- in MATH141; and must have completed any MATH or STAT course with a prerequisite of MATH141.
Credit Only Granted for: MATH240, MATH341, or MATH461.
Additional Information: This course may not be used towards the upper level math requirements for MATH/STAT majors.

MATH462 Partial Differential Equations (3 Credits)
Linear spaces and operators, orthogonality, Sturm-Liouville problems and eigenfunction expansions for ordinary differential equations. Introduction to partial differential equations, including the heat equation, wave equation and Laplace's equation. Boundary value problems, initial value problems and initial-boundary value problems.
Prerequisite: 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (MATH246, MATH341).

MATH463 Complex Variables for Scientists and Engineers (3 Credits)
The algebra of complex numbers, analytic functions, mapping properties of the elementary functions. Cauchy integral formula. Theory of residues and application to evaluation of integrals. Conformal mapping.
Prerequisite: 1 course with a minimum grade of C- from (MATH241, MATH340).

MATH464 Transform Methods for Scientists and Engineers (3 Credits)
Fourier transform, Fourier series, discrete fast Fourier transform (DFT and FFT). Laplace transform. Poisson summations, and sampling. Optional Topics: Distributions and operational calculus, PDEs, Wavelet transform, Radon transform and applications such as Imaging, Speech Processing, PDEs of Mathematical Physics, Communications, Inverse Problems.
Prerequisite: 1 course with a minimum grade of C- from (MATH246, MATH341).

MATH470 Mathematics for Secondary Education (3 Credits)
An advanced perspective on some of the core mathematics underlying high school mathematics courses. Topics include number systems, functions of one variable, equations, inequalities, trigonometric functions, curve fitting, and polynomials. The course includes an analysis of alternate approaches to mathematical ideas and problems, and makes connections between ideas that may have been studied separately in different high school and college courses.
Prerequisite: MATH141 and MATH140; and must have completed one 400-level MATH course (not to include MATH461, 478, and 480's).

MATH475 Combinatorics and Graph Theory (3 Credits)
General enumeration methods, difference equations, generating functions. Elements of graph theory, matrix representations of graphs, applications of graph theory to transport networks, matching theory and graphical algorithms.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341); and 1 course with a minimum grade of C- from (MATH241, MATH340); and permission of CMNS-Mathematics department. Also offered as: CMSC475.
Credit Only Granted for: MATH475 or CMSC475.

MATH478 Selected Topics For Teachers of Mathematics (1-3 Credits)

MATH480 Algebra for Middle School Teachers (3 Credits)
Prepares teachers with elementary certification to teach Algebra 1 in middle school. Focuses on basic algebra concepts and related theoretical ideas.
Prerequisite: MATH214.
Restriction: Must be a middle school teacher; and permission of CMNS-Mathematics department.
Credit Only Granted for: MATH480 or MATH483.
Additional Information: Not applicable to MATH/STAT major or minor requirements.

MATH481 Statistics and Data Analysis for Middle School Teachers (3 Credits)
Prepares teachers with elementary certification to teach simple data analysis and probability in middle school. Focuses on understanding basic statistics, data analysis, and related theoretical ideas.
Prerequisite: MATH214.
Restriction: Must be a middle school teacher; and permission of CMNS-Mathematics department.
Credit Only Granted for: MATH481 or MATH485.
Additional Information: Not applicable to MATH/STAT major or minor requirements.

MATH482 Geometry for Middle School Teachers (3 Credits)
Prepares teachers with elementary certification to teach geometry in middle school. Focuses on understanding basic geometry concepts and related theoretical ideas.
Prerequisite: MATH214.
Restriction: Must be a middle school teacher; and permission of CMNS-Mathematics department.
Credit Only Granted for: MATH482 or MATH484.
Additional Information: Not Applicable to MATH/STAT major or minor requirements.

MATH483 Algebra for High School Teachers (3 Credits)
Focuses on concepts related to algebra and trigonometry, including functions, equations, inequalities, and data analysis. Assumes a good understanding of calculus.
Prerequisite: MATH141.
Restriction: Senior standing.
Credit Only Granted for: MATH483 or MATH480.
Additional Information: May not be used towards the upper level math requirements for the MATH minor.

MATH484 Geometry for High School Teachers (3 Credits)
Focuses on concepts related to geometry, including several geometry axiom schemes, transformations, and similarity. Includes constructions with Geometer's Sketchpad.
Prerequisite: MATH141; or students who have taken courses with comparable content may contact the department.
Restriction: Senior standing.
Credit Only Granted for: MATH482, MATH484, or MATH498E.
Formerly: MATH498E.

MATH485 Statistics for High School Teachers (3 Credits)
Focuses on concepts related to statistics and data analysis, including probability, sampling, distribution of data, and inference.
Prerequisite: MATH141; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: MATH481 or MATH485.
Additional Information: May not be used towards the upper level math requirements for the MATH minor.

MATH486 Calculus for High School Teachers (3 Credits)
Focuses on concepts related to one-variable calculus including limits, continuity, derivative, integrals, series, and applications of these topics.
Prerequisite: MATH141; and cannot be used toward the upper level math requirements for MATH/STAT majors.

MATH487 Number for Middle Grades Teachers (3 Credits)
The rational number and proportional reasoning concepts developed in the middle grades and the larger mathematical context for these. Multiple representations of relationships, including verbal descriptions, diagrams, tables, graphs, and equations. Common misconceptions.
Prerequisite: Must have admission to M.A. or M.Ed. with concentration in Mathematics Education; or permission of CMNS-Mathematics department.
Restriction: This course may not be used towards the upper level math requirements for the MATH/STAT major.
Credit Only Granted for: MATH487 or MATH498K.
Formerly: MATH498K.

MATH489 Research Interactions in Mathematics (1-3 Credits)
Students participate in a vertically integrated (undergraduate, graduate and/or postdoctoral, faculty) mathematics research group. Format varies. Students and supervising faculty will agree to a contract which must be approved by the department. Up to three credits of MATH489 may be applied to the mathematics degree requirements. See the department's MATH489 online syllabus for further information.
Prerequisite: Permission of CMNS-Mathematics department.
Repeatable to: 10 credits if content differs.

MATH498 Selected Topics in Mathematics (1-9 Credits)
Topics of special interest to advanced undergraduate students will be offered occasionally under the general guidance of the departmental committee on undergraduate studies.
Repeatable to: 9 credits if content differs.

MATH600 Abstract Algebra I (3 Credits)
Groups with operators, homomorphism and isomorphism theorems, normal series, Sylow theorems, free groups, Abelian groups, rings, integral domains, fields, modules. Topics may include HOM (A,B), Tensor products, exterior algebra.
Prerequisite: MATH405 and MATH403; or students who have taken courses with comparable content may contact the department.

MATH601 Abstract Algebra II (3 Credits)
Field theory, Galois theory, multilinear algebra. Further topics from: Dedekind domains, Noetherian domains, rings with minimum condition, homological algebra.
Prerequisite: MATH600.

MATH602 Homological Algebra (3 Credits)
Projective and injective modules, homological dimensions, derived functors, spectral sequence of a composite functor. Applications.
Prerequisite: MATH600.

MATH603 Commutative Algebra (3 Credits)
Ideal theory of Noetherian rings, valuations, localizations, complete local rings, Dedekind domains.
Prerequisite: MATH600.

MATH606 Algebraic Geometry I (3 Credits)
Prime and primary ideals in Noetherian rings, Hilbert Nullstellensatz, places and valuations, prevarieties (in the sense of Serre), dimension, morphisms, singularities, varieties, schemes, rationality.
Prerequisite: MATH600 and MATH601.

MATH607 Algebraic Geometry II (3 Credits)
Topics in contemporary algebraic geometry chosen from among: theory of algebraic curves and surfaces, elliptic curves, Abelian varieties, theory of schemes, theory of zeta functions, formal cohomology, algebraic groups, reduction theory.
Prerequisite: MATH606.

MATH620 Algebraic Number Theory I (3 Credits)
Algebraic numbers and algebraic integers, algebraic number fields of finite degree, ideals and units, fundamental theorem of algebraic number theory, theory of residue classes, Minkowski's theorem on linear forms, class numbers, Dirichlet's theorem on units, relative algebraic number fields, decomposition group, inertia group and ramification group of prime ideals with respect to a relatively Galois extension.
Prerequisite: MATH601.

MATH621 Algebraic Number Theory II (3 Credits)
Valuation of a field, algebraic function fields, completion of a valuation field, ramification exponent and residue class degree, ramification theory, elements, differents, discriminants, product formula and characterization of fields by the formula, Gauss sum, class number formula of cyclotomic fields.
Prerequisite: MATH600. And MATH620; or students who have taken courses with comparable content may contact the department.

MATH630 Real Analysis I (3 Credits)
Lebesgue measure and the Lebesgue integral on R, differentiation of functions of bounded variation, absolute continuity and fundamental theorem of calculus, Lp spaces on R, Riesz-Fischer theorem, bounded linear functionals on Lp, measure and outer measure, Fubini's theorem.
Prerequisite: MATH411; or students who have taken courses with comparable content may contact the department.

MATH631 Real Analysis II (3 Credits)
Abstract measure and integration theory, metric spaces, Baire category theorem and uniform boundedness principle, Radon-Nikodym theorem, Riesz Representation theorem, Lebesgue decomposition, Banach and Hilbert Spaces, Banach-Steinhaus theorem, topological spaces, Arzela-Ascoli and Stone-Weierstrass theorems, compact sets and Tychonoff's theorem.
Prerequisite: MATH630.

MATH632 Functional Analysis (3 Credits)
Introduction to functional analysis and operator theory: normed linear spaces, basic principles of functional analysis, bounded linear operators on Hilbert spaces, spectral theory of selfadjoint operators, applications to differential and integral equations, additional topics as time permits.
Prerequisite: MATH631.

MATH634 Harmonic Analysis (3 Credits)
L1 theory: Fejer theorem, inversion theorem, ideal structure, Tauberian theorem. L2 theory: Plancherel-Parseval theorems, Paley-Wiener theorem. Lp theory: Hausdorff-Young theorem. Distribution theory: Bochner's theorem, Wiener continuous measures theorem, Malliavin theorem, Schwartz theory, almost periodic functions.
Prerequisite: MATH630.

MATH636 Representation Theory (3 Credits)
Introduction to representation theory of Lie groups and Lie algebras; initiation into non-abelian harmonic analysis through a detailed study of the most basic examples, such as unitary and orthogonal groups, the Heisenberg group, Euclidean motion groups, the special linear group. Additional topics from the theory of nilpotent Lie groups, semisimple Lie groups, p-adic groups or C-algebras.
Prerequisite: MATH631.

MATH642 Dynamical Systems I (3 Credits)
Foundations of topological dynamics, homeomorphisms, flows, periodic and recurrent points, transitivity and minimality, symbolic dynamics. Elements of ergodic theory, invariant measures and sets, ergodicity, ergodic theorems, mixing, spectral theory, flows and sections. Applications of dynamical systems to number theory, the Weyl theorem, the distribution of values of polynomials, Vander Waerden's theorem on arithmetic progressions.
Prerequisite: MATH432. And MATH630; or students who have taken courses with comparable content may contact the department.

MATH643 Dynamical Systems II (3 Credits)
Entropy theory, variational principle for the entropy, expansiveness, measures with maximal entropy. Smooth systems on manifolds, diffeomorphisms and flows, periodic points, stable and unstable manifolds, homoclinic points, transversality, the Krupka-Smale theorem, Morse-Smale systems. Hyperbolicity, Anosov systems, distributions and foliations, strange attractors, Bowen's measure.
Prerequisite: MATH642; or students who have taken courses with comparable content may contact the department.

MATH660 Complex Analysis I (3 Credits)
Linear transformations, analytic functions, conformal mappings, Cauchy's theorem and applications, power series, partial fractions and factorization, elementary Riemann surfaces, Riemann's mapping theorem.
Prerequisite: MATH410; or students who have taken courses with comparable content may contact the department.

MATH661 Complex Analysis II (3 Credits)
Topics in conformal mappings, normal families, Picard's theorem, classes of univalent functions, extremal properties, variational methods, elliptic functions, Riemann surfaces.
Prerequisite: MATH630 and MATH660.

MATH669 Selected Topics in Riemann Surfaces (1-3 Credits)
Construction of Riemann surfaces, hyperbolic geometry, Fuchsian and Kleinian groups, potential theory, uniformisation spaces of meromorphic functions, line bundles, Picard variety, Riemann-Roch, Teichmueller theory.
Restriction: Permission of instructor.
Repeatable to: 99 credits if content differs.

MATH670 Ordinary Differential Equations I (3 Credits)
Existence and uniqueness, linear systems usually with Floquet theory for periodic systems, linearization and stability, planar systems usually with Poincare-Bendixson theorem.
Prerequisite: MATH405. And MATH410; or students who have taken courses with comparable content may contact the department. Also offered as: AMSC670.
Credit Only Granted for: AMSC670 or MATH670.

MATH671 Ordinary Differential Equations II (3 Credits)
The content of this course varies with the interests of the instructor and the class. Stability theory, control, time delay systems, Hamiltonian systems, bifurcation theory, and boundary value problems, and the like.
Prerequisite: MATH630. And MATH670 or AMSC670; or students who have taken courses with comparable content may contact the department. Also offered as: AMSC671.
Credit Only Granted for: AMSC671 or MATH671.

MATH673 Partial Differential Equations I (3 Credits)
Analysis of boundary value problems for Laplace's equation, initial value problems for the heat and wave equations. Fundamental solutions, maximum principles, energy methods. First order nonlinear PDE, conservation laws. Characteristics, shock formation, weak solutions. Distributions, Fourier transform.
Prerequisite: MATH411; or students who have taken courses with comparable content may contact the department. Also offered as: AMSC673.
Credit Only Granted for: AMSC673 or MATH673.

MATH674 Partial Differential Equations II (3 Credits)
Boundary value problems for elliptic partial differential equations via operator-theoretic methods. Hilbert spaces of functions. Duality, weak convergence. Sobolev spaces. Spectral theory of compact operators. Eigenfunction expansions.
Prerequisite: MATH673 or AMSC673; or permission of instructor. Also offered as: AMSC674.
Credit Only Granted for: AMSC674 or MATH674.

MATH689 Research Interactions in Mathematics (1-3 Credits)
The students participate in a vertically integrated (undergraduate, graduate and/or postdoctoral, faculty) research group. Format varies, but includes regular meetings, readings and presentations of material. See graduate program's online syllabus or contact the graduate program director for more information.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

MATH695 Teaching Seminar (1 Credit)
A course intended for first year teaching assistants. Topics include: everyday mechanics of teaching; teaching methods and styles; technology; course enrichment, diversity in the classroom; sexual harassment; teacher-student interactions; presentations by students.
Restriction: Must be in one of the following programs (Mathematics (Doctoral); Mathematics (Master's); Mathematical Statistics (Doctoral); Applied Mathematics and Scientific Computation (Master's); Mathematical Statistics (Master's); Applied Mathematics and Scientific Computation (Doctoral)).

MATH712 Mathematical Logic I (3 Credits)
Sentential logic, first-order languages, models and formal deductions. Basic model theory including completeness and compactness theorems, other methods of constructing models, and applications such as non-standard analysis.

MATH713 Mathematical Logic II (3 Credits)
Incompleteness and undecidability results of Godel, Church, Tarski and others. Recursive function. Basic proof theory and axiomatic set theory.
Prerequisite: MATH712.

MATH730 Fundamental Concepts of Topology (3 Credits)
Survey of basic point set topology, fundamental group, covering spaces, Van Kampen's theorem, simplicial complexes, simplicial homology, Euler characteristics and classification of surfaces.
Prerequisite: MATH403, MATH410, and MATH411; or students who have taken courses with comparable content may contact the department.

MATH734 Algebraic Topology (3 Credits)
Singular homology and cohomology, cup products, Poincare duality, Eilenberg-Steenrod axioms, Whitehead and Hurewicz theorems, universal coefficient theorem, cellular homology.
Prerequisite: MATH403; or students who have taken courses with comparable content may contact the department.
Recommended: MATH730.

MATH740 Fundamental Concepts of Differential Geometry (3 Credits)
Manifolds, tangent vectors and differential forms, Riemannian metrics, connections, curvature, structure equations, geodesics, calculus of variations.
Prerequisite: MATH405, MATH411, and MATH730; or students who have taken courses with comparable content may contact the department.

MATH742 Geometric Analysis (3 Credits)
Calculus of Variations, Bochner technique, Morse theory, weak solutions and elliptic regularity, maximum principle for elliptic and parabolic equations, Green's function of the Laplacian, isoperimetric and Sobolev inequalities, continuity method, curvature and comparison results, harmonic maps, curvature prescription problems.
Prerequisite: MATH673 and MATH674; or MATH740.

MATH744 Lie Groups I (3 Credits)
An introduction to the fundamentals of Lie groups, including some material on groups of matrices and Lie algebras.
Prerequisite: MATH405, MATH403, MATH411, and MATH432; or students who have taken courses with comparable content may contact the department.

MATH799 Master's Thesis Research (1-6 Credits)

MATH808 Selected Topics in Algebra (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH818 Selected Topics in Logic (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH848 Selected Topics in Geometry and Topology (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH858 Selected Topics in Analysis (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH868 SelectedTopics in Complex Analysis (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH898 Pre-Candidacy Research (1-8 Credits)

MATH899 Doctoral Dissertation Research (1-8 Credits)

MEES - Marine-Estuarine-Environmental Sciences

MEES432 Physiological Ecology of Animals (3 Credits)
An examination of the influence of environmental constrains on animal function and energetic efficiency in the context of abiotic conditions in the habitats occupied by individuals.
Prerequisite: BSCI361; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Credit Only Granted for: MEES498E, MEES698E, MEES432, or MEES632.
Formerly: MEES498E.

MEES498 Topics in Marine-Estuarine-Environmental Sciences (1-4 Credits)
Lecture and/or laboratory series organized to study a selected area of marine-estuarine-environmental sciences not otherwise considered in formal courses.

MEES604 Biometry (3 Credits)
Application of inferential statics to environmental data, design a sound experiments and studies, and a working knowledge of R.
Credit Only Granted for: BIOM601, MEES604, MEES698B.
Formerly: MEES698B.

MEES605 Energy and Environment (3 Credits)
Role of energy in environmental and human-dominated systems and their linkage. Discussion of the historical and modern production and consumption of energy. Energy systems simulation modeling, energy analysis and energy auditing. Review of national energy policies and proposed alternatives.
Prerequisite: MATH120; or must have completed MATH220; or students who have taken courses with comparable content may contact the department. Also offered as: ENST605.
Credit Only Granted for: ENST405, ENST605, MEES605, or MEES698Z.
Formerly: MEES698Z.

MEES606 Cell and Molecular Biology for Environmental Scientists (4 Credits)
An invisible world courses through every living thing. This is the world of molecules, tiny machines millions of time smaller than the machines we are most familiar with, like automobiles. Individually, each of the molecules is a delicate instrument, measuring, making, weighing, and building the thing we call life. The molecules of living things are unique among the molecules of the Earth. These tiny molecular messengers, engines, and machines are built to perform highly specific tasks unlike the molecules formed by physical processes.
Prerequisite: An undergraduate course in cell biology or biochemistry.
Credit Only Granted for: MEES698C or MEES606.
Formerly: MEES698C.

MEES607 Quantitative Methods in Environmental Sciences (3 Credits)
Mathematical approaches and solutions (both analytical and numerical) that cut across environmental disciplines, and will introduce analytical techniques.
Prerequisite: MATH120 and MATH121; or must have completed MATH220 and MATH221; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: MEES607 or MEES698G.
Formerly: MEES698G.

MEES608 Seminar in Marine-Estuarine-Environmental Sciences (1-2 Credits)

MEES610 Land Margin Interactions (4 Credits)
Broad overview of the components and biogeochemistry of the coastal zone(atmosphere, land, streams, wetlands, estuaries) and the time and space scales on which interactions occur between components. Includes 4 h of classes per week with readings from the literature, field trips, a term paper, and a forum. Course is taught on the Interactive Video Network.
Credit Only Granted for: MEES610 or MEES698I.
Formerly: MEES698I.

MEES611 Estuarine Systems Ecology (3 Credits)
A broad systems perspective on the important components and processes of estuarine ecosystems, with quantitative and/or mathematical treatment toward development of representative models for estuarine dynamics.
Restriction: Permission of instructor.

MEES614 Landscape Ecology (4 Credits)
Landscape ecology emphasizes spatial patterning--its causes, development, and importance for ecological processes. Students will become familiar with concepts, methods, and applications of landscape ecology through reading classic and contemporary literature representative of state-of-the-art research; class lectures; completion of two projects designed to provide "hands on" experience with some of the quantitative methods and tools; and completion of one independent project.
Restriction: Permission of instructor.

MEES616 Fisheries Oceanography (3 Credits)
Combines the disciplines of physical oceanography, biological oceanography and fisheries science to understand how environmental variability, ecosystems and humans influence harvested fish and shellfish populations. Physical-biological interactions from small-scale processes that influence individual larvae to basin-scale oscillations in climate that shift ecosystems.
Prerequisite: MEES661, AOSC670, MEES621, MEES631, MEES634, or MEES682; or permission of instructor.
Credit Only Granted for: MEES698F or MEES616.
Formerly: MEE698F.

MEES617 Hydrological Effects of Land Use Change (3 Credits)
Detailed examination of the catchment-scale hydrological effects attributable to major land use and land cover alterations, including both anthropic and non-anthropic disturbances.
Prerequisite: Statistics course and hydrology course or permission of instructor.

MEES621 Biological Oceanography (4 Credits)
Population and community ecology of estuarine and marine systems; coastal and estuarine processes are emphasized in the context of oceans in general. Field and lab trips required.

MEES626 Environmental Geochemistry I (3 Credits)
Brief overview of biogeochemical cycles; fundamental aquatic chemistry that can be applied to a variety of environmental systems.
Recommended: Completion of one semester of physical chemistry is recommended.
Restriction: Permission of instructor.
Credit Only Granted for: MEES626 or MEES698L.
Formerly: MEES698L.

MEES627 Environmental Geochemistry II (3 Credits)
Detailed examination of aquatic geochemical cycles, including inorganic and organic geochemistry. Topics include global biogeochemical cycles, estuarine cycling, redox cycles, radiochemistry, stable isotope biogeochemistry and sediment biogeochemistry/diagenesis.
Prerequisite: MEES626; or permission of instructor.
Credit Only Granted for: MEES627 or MEES698K.
Formerly: MEES698K.

MEES631 Fish Ecology (3 Credits)
Study of the interrelationships between individuals, their communities and environment. Explores the environmental biology of fish, feeding ecology, energetics and growth, population biology, reproduction and life history, and population and community interactions.
Restriction: Permission of instructor.

MEES632 Physiological Ecology of Animals (3 Credits)
An examination of the influence of environmental constrains on animal function and energetic efficiency in the context of abiotic conditions in the habitats occupied by individuals.
Credit Only Granted for: MEES698E, MEES498E, MEES432, MEES632.
Formerly: MEES698E.

MEES637 Zooplankton Ecology (3 Credits)
A quantitative investigation of zooplankton ecology, emphasizing population dynamics and modeling, feeding, behavior, food-webs, and bio-physical interactions.
Prerequisite: MEES621; or permission of instructor.
Credit Only Granted for: MEES698G, MEES637.
Formerly: MEES698G.

MEES650 Wetland Ecology (3 Credits)
Plant and animal communities, biogeochemistry, and ecosystem properties of wetland systems. Laboratory emphasizes collection and analysis of field data on wetland vegetation, soil, and hydrology.
Prerequisite: BIOM301; or permission of instructor. Also offered as: ENST650.
Credit Only Granted for: ENST450, ENST650, or MEES650.

MEES652 Advanced Wetland Creation and Restoration (3 Credits)
Design, construction, and evaluation of wetlands restored or created for ecosystem enhancement or mitigation. Topics will include ecological restoration theory, goal-setting practices for establishing wetland hydrology, substrate, and vegetation, and restored ecosystem monitoring and functional assessment.
Prerequisite: BSCI362, ENST450, or MEES650; and (BSCI160 and BSCI161; or BSCI106). Or permission of CMNS-Marine & Estuarine-Environmental Science Prog. Also offered as: ENST652.
Credit Only Granted for: ENST452, ENST652, or MEES652.

MEES661 Physics of Estuarine and Marine Environments (3 Credits)
General introduction to the physical oceanography of estuarine and marine systems. Physical characteristics of seawater, heat and mass transport, major ocean currents, basic dynamical oceanography, surface waves, tides, turbulence, sediment transport, estuarine circulation.
Prerequisite: Must have completed one year of physics coursework; and must have completed one year of calculus coursework. Or permission of instructor.

MEES670 Conservation Biology (3 Credits)
Conservation in the Anthropocene means conserving biodiversity and ecosystem function in the midst of climate change, habitat loss, overexploitation, altered nutrient cycling, and invasive species with protected areas and reserve networks, ecosystem restoration, and other biodiversity conservation and management schemes.Also offered as: CONS670.
Credit Only Granted for: CONS670 or MEES670.

MEES671 Remote Sensing for Environmental Management (4 Credits)
Coverage of tools necessary to carry out remote sensing studies of ecosystem pattern and process, land-use and land-cover change and the impact of climate changes. General overview of recent research at the interface of remote sensing, ecosystem analysis, global change, and environmental management.
Credit Only Granted for: MEES671, MEES698X.
Formerly: MEES698X.

MEES681 Advanced Ecological Design (4 Credits)
An advanced survey course on the field of ecological design. Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development.
Prerequisite: (CHEM131; or students who have taken courses with comparable content may contact the department); and (MATH120; or must have completed MATH220); and PHYS121. Or permission of instructor. Also offered as: ENST481, ENST681.
Credit Only Granted for: ENST481, ENST681, or MEES681.

MEES682 Fishery Science and Management (3 Credits)
Aquatic production and fisheries yields. Introduction to fish population dynamics and assessment methods. Effects of fishing on resource potential yields. Causes of fluctuations in resource abundance. An emphasis on the relationship between science and management.
Restriction: Permission of instructor.

MEES698 Special Topics in Marine-Estuarine-Environmental Sciences (1-4 Credits)
Credit according to time schedule and course organization. Lecture and/or laboratory series organized to study selected areas of environmental science not otherwise considered by existing courses. May be repeated for credit since topic coverage will change.

MEES699 Special Problems in Marine-Estuarine-Environmental Sciences (1-3 Credits)
Research on specialized topics under the direction of individual faculty members.

MEES708 Advanced Topics in Marine-Estuarine-Environmental Science (1-4 Credits)
Lectures, experimental courses and other specialized graduate training in various relevant disciplines.
Repeatable to: 12 credits if content differs.

MEES712 Advanced Population Dynamics and Assessment (4 Credits)
Quantitative and modeling skills, including understanding of population dynamics and responses of populations to exploitation and management actions. Coverage of population models of production, mortality, stock and recruitment, age and growth, and harvesting, and methods for using these models to provide management advice.
Prerequisite: MEES607 or BIOM601; or permission of instructor.
Credit Only Granted for: MEES698D or MEES712.
Formerly: MEES698D.

MEES743 Aquatic Toxicology (3 Credits)
Comprehensive course in which a definitive description of basic concepts and principles, laboratory testing and field situations, as well as examples of typical data and their interpretation and use by industry and water resource managers, will be discussed. The toxicological action and fate of environmental pollutants will be examined in aquatic ecosystems, whole organisms and at the cellular, biochemical and molecular levels.

MEES799 Masters Thesis Research (1-6 Credits)

MEES898 Pre-Candidacy Research (1-8 Credits)

MEES899 Doctoral Dissertation Research (1-8 Credits)

MIEH - Maryland Institute for Applied Environmental Health

MIEH400 Introduction to Global Health (3 Credits)
Exploration of theoretical frameworks and practical perspectives on issues shaping the global health panorama. Determinants examined through: biological and epidemiological; social, cultural and economic; environmental and geographic; multi-section, legal and institutional perspectives with synopsis of how these issues are addressed by international and community organizations in developing countries.
Prerequisite: Minimum grade of C- in MIEH300; and 1 course with a minimum grade of C- from (SPHL100, PHSC300).
Restriction: Must be in the Public Health Science program or must have permission of the program director; and must have completed 60 credits.
Credit Only Granted for: MIEH400 or SPHL498A.
Formerly: SPHL498A.

MIEH480 Introduction to Occupational Health (3 Credits)
An introduction to the field of occupational health and safety. Introduction to basic concepts in occupational safety and health, as well as the methods used to anticipate, recognize, evaluate, and control environmental factors or stresses arising in or from the workplace. In addition to instructor-led lectures, guest speakers will be invited to discuss case studies and/or discuss workplace hazards unique to specific populations.
Prerequisite: Minimum grade of C- in MIEH300.
Recommended: BSCI201; and EPIB301.
Restriction: Must be in a major in SPHL-School of Public Health.

MIEH600 Foundations of Environmental Health (3 Credits)
Overview of the chemical, physical and biological hazards present in our living and working environment and their effects on human health. Topics include: exposure assessment, industrial hygiene and safety, pesticides, community and indoor pollution, food-borne diseases, solid and hazardous wastes, water resources, risk assessment, ecological issues and environmental laws.
Credit Only Granted for: HLTH761 or MIEH600.
Formerly: HLTH761.

MIEH605 Fundamentals of Global Health (3 Credits)
Exploration of theoretical frameworks and practicial perspectives in global health with particular attention to the analysis of the biological, epidemiological, social, cultural and behavioral interactions that affect global health study and project implementation. The emphasis is on innovative solutions to health issues in underserved populations.
Credit Only Granted for: SPHL600 or SPHL698A.
Formerly: SPHL698A.

MIEH609 Methods in Environmental Health (1-3 Credits)
This research-based rotation in environmental health sciences will provide graduate students with the opportunity to work closely with faculty researchers in the Maryland Institute for Applied Environmental Health (MIAEH) within the School of Public Health. Our research covers multiple fields within the environmental health sciences (e.g. environmental epidemiology, exposure science, risk assessment, environmental microbiology, environmental microbiology, environmental microbial genomics, food toxicology, airborne infection transmission, environmental justice, and children's environmental health) that involve either laboratory-based research or non-laboratory based studies. Students will not only gain invaluable research experience and interpersonal skills but also contribute to MIAEH's ongoing environmental health research programs.
Repeatable to: 6 credits.

MIEH610 Global Health Program Planning and Evaluation (3 Credits)
Development of health program and evaluation plans to address critical health problems in international settings, especially transitional or in-conflict countries. Emphasis on linking a tactical program plan to overall health problems of a nation, to include the policy and economic issues involved in assessment, implementation and evaluation.
Recommended: MIEH605.
Credit Only Granted for: MIEH610, SPHL610 or SPHL698D.
Formerly: SPHL698D and SPHL610.

MIEH620 Global Health Communication and Promotion (3 Credits)
Explores the critical components in developing, implementing and evaluating health/population promotion and communication interventions. Emphasis is on theory application to a variety of cultural settings. Formative and quantitative research methods will be utilized.
Recommended: MIEH605.
Credit Only Granted for: SPHL620 or SPHL698C.
Formerly: SPHL698C.

MIEH688 Seminar in the Maryland Institute for Applied Environmental Health: Current Topics in Environmental Health (1 Credit)
Invited and in-house research presentations from guest scientists, faculty members, and students, and critical analysis of journal articles on current topics in environmental and occupational health.
Repeatable to: 3 credits.

MIEH698 Special Topics in Environmental Health (1-3 Credits)
Special topics in environmental health.
Repeatable to: 12 credits if content differs.

MIEH700 Advanced Environmental Health (3 Credits)
An advanced doctoral course in environmental health science focused on the application of knowledge gained in foundational and scientific methods courses to solve environmental health problems. The course will engage students in: problem identification; critical evaluation of the existing state of scientific knowledge and gaps regarding the problem; selection and use of appropriate scientific methods to assess the problem; generation of accurate conclusions based on critical evaluation of the findings; and, finally, accurate communication of findings, uncertainties and conclusions to various target audiences and stakeholders.
Prerequisite: MIEH600 and MIEH780; and permission of instructor.

MIEH720 Principles of Toxicology (3 Credits)
Overview of toxicology, including exposure pathways, toxicokinetics, dermal toxicants, carcinogens, and genetic, reproductive, immuno-, nuero-, target organs, complex mixtures, structure-activity analysis, and determinants of hypo- and hyper-susceptibility. Case studies of global national and regional interest.
Prerequisite: MIEH600; or permission of instructor.
Recommended: Must have completed some coursework in chemistry and/or biology.

MIEH721 Physiological Toxicology (3 Credits)
Emphasis on macromolecular, metabolic, cellular, and physiologic targets of environmental contaminants and assays to detect toxic effects at these levels. Discussion of effects of select environmental toxicants in the context of their disruption of normal processes. Examination of the design of short-term assays and their desirable features to maximize usefulness for predicting human disease.
Prerequisite: MIEH600.
Recommended: Must have completed coursework in chemistry, biology, biochemistry, and genetics.

MIEH722 Laboratory Methods in Environmental Health (3 Credits)
Application of chemical principles to environmental monitoring. Basic sampling techniques and laboratory tests to determine chemical and microbiological pollutants in water, air and soil from field-collected samples.
Prerequisite: MIEH600.
Recommended: Must have completed coursework in analytical chemistry, microbiology, biochemistry.

MIEH725 Environmental Analysis (3 Credits)
Fundamentals of environmental chemistry and in environmental media (water, air, soil) and in biota. Theory of sampling, chemical analysis and quality control for major environmental contanimants. Introduction to spatial and statistical analysis, use of maps and Geographic Information Systems, and use of environmental anaylsis in remediation and pollution prevention.
Prerequisite: MIEH600.
Recommended: MIEH722.

MIEH730 Environmental Justice, Built Environment, and Health Disparities (3 Credits)
This course will give students the opportunity to conduct an in-depth analysis of environmental justice and environmental racism in the United States and internationally. Students will synthesize their knowledge from environmental science courses with the concepts of civil rights and social justice to more fully understand the existing health disparities and how the built environment contributes to them.
Prerequisite: Must have completed an Environmental Health course.

MIEH735 Food Toxicology (3 Credits)
An introduction to basic concepts in toxicology in relation to toxic food contaminants and additives; both synthetic and naturally occurring. Focus on exposure routes, molecular targets and susceptible individuals. Also includes regulatory toxicology with respect food toxins.
Recommended: BSCI440, CHEM131, or BCHM462. Also offered as: NFSC735.
Credit Only Granted for: MIEH735 or NFSC735.

MIEH740 Environmental Health Risk Assessment (3 Credits)
Review of the major methods of human and ecological risk assessment conducted by the U.S. Environment Protection Agency. Emphasis on sources of uncertainty.
Prerequisite: MIEH600; or permission of instructor.

MIEH742 Principles of Industrial Hygiene (3 Credits)
Theory and practice of industrial hygiene, including major industrial exposures and their sampling and measurement. Focus on specific industries, work populations, and environments.
Prerequisite: MIEH600 and MIEH720.

MIEH750 Enviornmental Hazard Management (3 Credits)
Overview of the stakeholders and processes of environmental management. Emphasis on theory and practice, including examination of diverse perspectives relating to environmental management from sceince, business, regulatory agencies, and the law. Analysis of successes and failures of actual enviornmental management cases at the state, regional, US, and global levels.
Prerequisite: MIEH600.

MIEH760 Spatial Epidemiology (3 Credits)
The purpose of this survey course is to provide students with an introduction to spatial resources and methods specific to public health, with an emphasis on epidemiology and environmental applications. Students will be introduced to spatial resources, concepts, and tools relevant to public health research and practice. They will acquire skills to interpret, evaluate, and design basic public health spatial research projects; and to conduct simple spatial analyses.
Prerequisite: Must have completed an Introduction biostatistics course.
Recommended: Completion of a graduate epidemiology course, or environmental health course, or geography/GIS course.

MIEH770 Law and Policy in Environmental Health (3 Credits)
Overview of laws that affect the environment, and the various ways in which businesses are regulated by the government in the interest of protecting the environment. International, Federal, state, and local laws and regulations related to the protection of human health and the regulation of environmental containments, including biological, physical and chemical factors affecting community health. Examination of the interactions between and differing responsibilities of various agencies enforcing environmental laws and regulations.
Prerequisite: MIEH600; or permission of instructor.

MIEH771 Exposure Assessment of Environmental Hazards (3 Credits)
Approaches and methods for determining exposure to environmental contaminants. Biomonitoring and genetic methods to detect recent exposures. Optimizing exposure assessment.
Prerequisite: MIEH600; and must have completed a graduate level statistics course with a B- or higher. Or permission of instructor.

MIEH773 Foodborne, Waterborne and Airborne Infectious Diseases (3 Credits)
In-depth study of foodborne, waterborne and airborne diseases caused by bacteria, viruses and parasites. Topics will include sources and detection of causative agents; their transmission to humans via food, water, air and other environmental media; and methods of disease prevention, including food safety approaches and drinking water treatment. Classes include lectures, discussions, field-trips and hands-on field sampling and laboratory activities.
Corequisite: MIEH600; or permission of instructor.

MIEH778 Internship in Public Health (1-4 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Restriction: Permission of SPHL-Maryland Institute for Applied Environmental Health.
Repeatable to: 4 credits.
Credit Only Granted for: MIEH785 or MIEH778.

MIEH780 Occupational Health (3 Credits)
A synthesis of epidemiology, toxicology, exposure science, risk assessment, and policy. Emphasis will be on methods for anticipating, recognizing, evaluating and controlling workplace hazards; the hierarchy of controls; and current hot topics in occupational health.
Prerequisite: MIEH720 and MIEH771; and must have completed SPHL602. Or permission of instructor.

MIEH785 Internship in Public Health (3 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Restriction: Permission of SPHL-Maryland Institute for Applied Environmental Health.
Credit Only Granted for: MIEH785 or MIEH778.

MIEH786 Captsone Project in Public Health (3 Credits)
Capstone experience provding opportunity to apply knowledge and skills to a specific public health problem or issue. Completion of project relevant to public health under the direction of an advisor.
Prerequisite: Permission of SPHL-Maryland Institute for Applied Environmental Health.

MIEH788 Critical Readings in Environmental Health (1-3 Credits)
In-depth examination and critical discussion of the current literature relevant to environmental health.
Prerequisite: MIEH600.
Repeatable to: 3 credits if content differs.

MIEH789 Independent Study (1-6 Credits)
Individual reading and/or research under a specific faculty member in the department.
Prerequisite: Permission of SPHL-Maryland Institute for Applied Environmental Health.

MIEH799 Master's Thesis Research (1-6 Credits)

MIEH899 Doctoral Dissertation Research (1-8 Credits)

MITH - Maryland Institute for Technology in the Humanities

MITH498 Special Topics in Applied Digital Humanities (3 Credits)
An introduction to special topics, and technical approaches, for theoretically grounded humanities and social sciences digital research. Class meetings will introduce students to a variety of technical approaches potentially applicable to the specific topical foci; the theoretical basis for selecting, evaluating, and modifying technical approaches; and best practices in project management.
Repeatable to: 9 credits if content differs.

MITH610 Introduction to Digital Studies in the Arts and Humanities (3 Credits)
An introduction to digital studies in the arts and humanities, broadly conceived as the critical, creative, and practical engagement with digital media, methods, tools, and experiences, as well as the theoretical and conceptual bases for understanding them.

MITH729 Colloquium in Digital Studies (1 Credit)
Colloquium in support of the ARHU-MITH Graduate Certificate in Digital Studies. We will meet periodically (approximately 4-5 times a semester) to read and discuss current work in the field, interact with visiting speakers, share work in progress, learn new tools and methods, and hear research presentations from one another.
Repeatable to: 3 credits.

MITH735 Anatomy of Digital Humanities Research (3 Credits)
Positioned as a companion to a disciplinary research methods course, this course emphasizes best practices and critical approaches in the context of the lifecycle of a collaborative research project from ideation to publication to preservation. This course explores common digital methodologies as it teaches collaboration and fast prototyping to help students develop a reflexive critical approach to digital research projects. Upon completing the course, students will have a research plan, including the beginnings of a literature review, wireframes, and proposal for the lifecycle of the research project.

MLAW - MPower Undergraduate Law Programs

MLAW404 Law & Society Capstone: Implications of Technology on Law & Society (3 Credits)
An exploration of the implications of technology on law and society from a variety of perspectives.Significant issues will be taken from contemporary scholarship and court cases.
Restriction: Student must be enrolled in the Law and Society minor.

MOCB - Molecular and Cell Biology

MOCB608 Molecular and Cell Biology Seminar (1-2 Credits)
Seminar in molecular and cell biology.
Repeatable to: 5 credits if content differs.

MOCB639 Advanced Cell Biology (3 Credits)
Recent advances in key areas of modern cell biology.
Repeatable to: 6 credits if content differs.

MOCB699 Laboratory Rotation (2-3 Credits)
Laboratory experience in molecular-cell biology.
Prerequisite: Permission of CMNS-Molecular & Cell Biology Program (MCB).
Restriction: Must be in one of the following programs (Cell Biology and Molecular Genetics (Doctoral); Cell Biology and Molecular Genetics (Master's)).
Repeatable to: 6 credits if content differs.

MOCB708 Advanced Topics in Molecular and Cell Biology (1-4 Credits)
Lectures, experimental courses, and other special instructions in various areas of molecular or cell biology.
Repeatable to: 6 credits if content differs.

MOCB898 Pre-Candidacy Research (1-8 Credits)

MOCB899 Doctoral Dissertation Research (1-8 Credits)

MSMC - Museum Scholarship and Material Culture

MUED - Music Education

MUED411 Teaching Elementary Instrumental Music II (4 Credits)
Prepare instrumental-emphasis music education majors to synthesize the knowledge and skills that will enable them to develop and/or maintain an exemplary curricular-oriented, research-based, comprehensive elementary instrumental music program.
Prerequisite: MUED320 and MUED311.
Restriction: Must be in Music Education program.

MUED420 Teaching Secondary Instrumental Music II (4 Credits)
Prepare instrumental-emphasis music education majors to synthesize the knowledge and skills that will enable them to develop and/or maintain an exemplary, curricular-oriented, research-based, comprehensive secondary instrumental program.
Prerequisite: MUED320 and MUED311.
Restriction: Must be in Music Education program.

MUED471 Teaching General Music (4 Credits)
An examination of children's musical development via model teaching experiences. Students in this course will be involved in learning appropriate techniques and materials used to plan, deliver, and assess musical instruction effectively in general music settings for K-12 students. The focus is on how to implement a sequential, balanced, and comprehensive music curriculum (i.e., artistic processes: creating, performing, and responding) that emphasizes opportunities for students to construct their own learning.
Prerequisite: MUED222 and MUED333.
Restriction: Must be in Music Education program.

MUED472 Teaching Choral Music (4 Credits)
Preparation for teaching choral classes through the integration of conducting technique, vocal pedagogy, knowledge of repertoire, and the application of appropriate instructional strategies in the context of peer teaching and field experience assignments.
Prerequisite: MUED471.
Restriction: Must be in Music Education program.

MUED473 Teaching General Music for Instrumentalists (2 Credits)
Introduction to current trends, materials and approaches in general music instruction.
Prerequisite: MUED311; and MUED320.
Restriction: Must be in Music Education program.

MUED474 Field Experiences: Pre-Student Teaching (2 Credits)
Field experiences to fulfill teaching requirements in K-12 music teacher education program.
Prerequisite: MUED420 and MUED411; or (MUED472 and MUED471).
Restriction: Permission of ARHU-School of Music department; and senior standing.

MUED484 Student Teaching in Elementary School: Music (6 Credits)
Fulfills elementary teaching requirements in K-12 music teacher education program. Limited to music education majors who have previously applied.
Corequisite: MUED494.
Restriction: Permission of ARHU-School of Music department; and must be in Music Education program.

MUED489 Field Experiences (1 Credit)
Series of field experiences in K-12 settings.
Restriction: Permission of ARHU-School of Music department; and must be in Music Education program.
Repeatable to: 6 credits.

MUED494 Student Teaching in Secondary School: Music (6 Credits)
Fulfill secondary teaching requirements in K-12 music teacher education program. Limited to music education majors who have previously applied.
Corequisite: MUED484.
Restriction: Permission of ARHU-School of Music department; and must be in Music Education program.

MUED499 Workshops, Clinics, Institutes (1-3 Credits)
Innovative and experimental dimensions of music education offered to meet the needs of music teachers and music supervisors allowing students to individualize their programs.
Repeatable to: 6 credits if content differs.

MUED672 Advanced Instrumental Methods in Music Education (3 Credits)
Teaching instrumental music in the K-12 setting, including recruiting, literature selection, curriculum, rehearsal techniques, and pedagogical approaches.
Restriction: Permission of ARHU-School of Music department.

MUED673 Beginning String Instruction: Principles and Applications in Group Process (3 Credits)
A survey of string instrument techniques, pedagogy, and materials for the elementary school. Includes hands-on review and extension of beginning-level string playing and teaching techniques through an organized, sequential approach.
Restriction: Permission of ARHU-School of Music department.

MUED677 Advanced Studies in Choral Music Education (3 Credits)
A critical review of choral music education in both school and community. Includes historical foundations, philosophical perspectives, and practical teaching applications in light of current scholarship.
Restriction: Permission of ARHU-School of Music department.

MUED688 Music Cultures in the Classroom II: Curriculum Materials and Teaching Strategies (3 Credits)
Designed to assist the music teacher in integrating music from selected cultures into the curriculum. Curriculum materials are presented and teaching strategies demonstrated.
Recommended: MUED687.
Restriction: Must be in a major within ARHU-School of Music department.
Repeatable to: 9 credits if content differs.

MUED690 Research Methods in Music and Music Education (3 Credits)
The application of methods of research to problems in the fields of music and music education. The preparation of bibliographies and the written exposition of research projects in the area of the student's major interest.

MUED691 Psychology of Music Teaching and Learning (3 Credits)
An overview of the psychological bases of musical behavior, with particular emphasis on the teaching and learning of music.
Restriction: Permission of ARHU-School of Music department.

MUED692 Foundations and Perspectives of Music Education (3 Credits)
An introduction to historical, sociological, and philosophical perspectives of music education.
Restriction: Permission of ARHU-School of Music department.

MUED696 Assessment in Music Education (3 Credits)
Historical and theoretical nature of assessment in education. Application and critique of various materials and approaches to assessment in music education. Development of appropriate evaluation and reporting tools.
Restriction: Permission of ARHU-School of Music department.

MUED697 Curriculum & Assessment in Music Education (3 Credits)
Theoretical and practical knowledge related to curriculum,assessment, and evaluation in music education. Course topics include: a) aspects of philosophy,sequencing, and design in music curricula; b) reliability, validity, and fairness in assessment; c) planning for and designing assessment of student knowledge and skills; d) policy, procedures, and outcomes associated with music teacher evaluation.

MUED698 Current Trends in Music Education (1-3 Credits)
A survey of current and emerging philosophies, methodologies and curricula in music education and their implementation. The influence of educational and social changes and the expanding musical scene upon the music programs for children of all ages and for teacher education.
Repeatable to: 8 credits if content differs.

MUED699 Workshops, Clinics, Institutes (1-3 Credits)
Innovative approaches to various dimensions of music education are offered to meet the pedagogical needs of music teachers. The maximum number of credits tht may be earned under this course symbol toward any degree is six semester hours; the symbol may be used two or more times unti sixsemester hours have been reached.
Repeatable to: 10 credits.

MUED729 Doctoral Colloquium in Music Education (1 Credit)
For students in PhD Progam in Music Education. Meets approximately 4-5 times per semester to read and discuss current work in the field, interact with visiting speakers, share work in progress, learn new tools and methods, and hear research presentations from one another
Restriction: Permission of instructor.
Repeatable to: 6 credits.

MUED780 Seminar in Music Teacher Education (3 Credits)
Development of knowledge and skills necessary for music teacher educators. Topics include history of and reform movements in music teacher education, recruitment, education and certification of music teachers and inservice programs.
Restriction: Must have doctoral standing in a Music Education program.

MUED785 Teaching Music in Higher Education (3 Credits)
Prepare students for music faculty positions in higher education institutions. The course readings, discussions, assignments, and experiences are aimed to develop the knowledge, skills, and dispositions necessary to be a successful member of the faculty at a variety of institutions.

MUED790 Design and Analysis of Research in Music Education (3 Credits)
Advanced applications of quantitative and qualitative social science research paradigms to research problems in the field of music education. Topics include the formation of researchable questions; the design of experimental, quasi-experimental, descriptive, and qualitative research studies; and the analysis and interpretation of research data.
Prerequisite: Must have completed a college-level statistics course. And MUED690; or an equivalent master's level research in music education course.

MUET - Ethnomusicology

MUSC - School of Music

MUSC400 Music Pedagogy (3 Credits)
Conference course. A study of major pedagogical treatises in music, and an evaluation of pedagogical techniques, materials, and procedures.
Prerequisite: MUSP315; and permission of ARHU-School of Music department.

MUSC420 Introduction to Ethnomusicology (3 Credits)
Study of principal concepts and methods in ethnomusicology, covering history of field, linguistics and anthropology, music in various settings, musical cognition and ethnography of performance.
Prerequisite: MUSC210 and MUSC130; or permission of ARHU-School of Music department.
Restriction: Junior standing or higher.

MUSC428 Repertoire Coaching of Vocal or Chamber Music (2 Credits)
A course for piano students who wish to go further than the work offered in MUSC128, MUSC228 and MUSC328 by becoming specialists in the areas of vocal coaching or chamber music coaching. Elements of pedagogy, conducting and responsible artistic decision-making for the entire musical production.
Prerequisite: Must have completed or be concurrently enrolled in MUSC328.

MUSC435 Music of North America (3 Credits)
A survey of North American music from Colonial times to present.
Prerequisite: Permission of ARHU-School of Music department.

MUSC436 Jazz: Then and Now (3 Credits)
Major styles and influential artists of the past 75 years of jazz.

MUSC438 Area Studies in Ethnomusicology (3 Credits)
Advanced study of musics in selected parts of the world.
Repeatable to: 9 credits if content differs.

MUSC439 Collegium Musicum (1 Credit)
Open to undergraduates and graduates, music majors and non-majors. Procurement, edition and performance of music not belonging to a standard repertory: early music, compositions for unusual performing media, works which demand reconstruction of their original circumstances of performance. Outcome of a semester's work may be one or more performances for the public.
Prerequisite: Permission of ARHU-School of Music department.
Repeatable to: 5 credits.

MUSC443 Solo Vocal Literature (3 Credits)
The study of solo vocal literature from the Baroque Cantata to the Art Song of the present. The Lied, Melodie, vocal chamber music and the orchestral song are examined.
Prerequisite: MUSC330 and MUSC331; or students who have taken courses with comparable content may contact the department.

MUSC444 Wind and Percussion Literature (1 Credit)
Recital program notes and written projects in wind or percussion literature.
Prerequisite: Permission of ARHU-School of Music department.
Corequisite: MUSP420 or MUSP419.

MUSC445 Survey of the Opera (3 Credits)
A study of the music, librettos and composers of the standard operas.
Prerequisite: MUSC330 and MUSC331; or students who have taken courses with comparable content may contact the department.

MUSC446 String Literature (1 Credit)
Recital program notes and written projects in string literature.
Prerequisite: MUSP316; and permission of ARHU-School of Music department.

MUSC448 Selected Topics in Music (1-3 Credits)

MUSC450 Musical Form (3 Credits)
A study of the principles of organization in music with emphasis on eighteenth and nineteenth century European music. Reading and analysis of scores exemplifying the musical forms.
Prerequisite: MUSC251.

MUSC451 Analysis of Music (3 Credits)
A course in the analysis of music. Discussion of individual works, with emphasis on their unique characteristics and on the relation of analysis to performance.
Prerequisite: MUSC450; or permission of instructor.

MUSC453 Jazz Improvisation I (3 Credits)
Jazz theory, notational conventions, improvisation techniques, reading and analysis of music, and performance in small combo format.
Prerequisite: MUSC251; or students who have taken courses with comparable content may contact the department. And permission of ARHU-School of Music department.
Credit Only Granted for: MUSC345 or MUSC453.
Formerly: MUSC345.

MUSC454 Jazz Improvisation II (3 Credits)
Continuation of MUSC453 including scoring and transcription.
Prerequisite: MUSC453; or students who have taken courses with comparable content may contact the department. And permission of ARHU-School of Music department.
Credit Only Granted for: MUSC346 or MUSC454.
Formerly: MUSC346.

MUSC455 Theory of Jazz (3 Credits)
Analysis of jazz harmony, with emphasis on principles of substitution, reharmonization, and syntax. Topics may also include chord/scale relationships, phrasing and articulation, notation, and introductory arranging concepts such as orchestration and form.
Prerequisite: MUSC250; or permission of ARHU-School of Music department.
Restriction: Must be in a major within ARHU-School of Music department.

MUSC456 Jazz Arranging (3 Credits)
A comprehensive approach to jazz arranging. Topics to include chord scale theory, voicing techniques, part and score layout, and formal construction of an arrangement.
Prerequisite: MUSC455; and permission of ARHU-School of Music department.
Credit Only Granted for: MUSC448N or MUSC456.
Formerly: MUSC448N.

MUSC460 Tonal Counterpoint I (3 Credits)
A course in Eighteenth-Century contrapuntal techniques, analysis and original composition of two-voice dances, preludes, and inventions. Includes an introduction to the study of fugue and canon.
Prerequisite: MUSC251; or permission of ARHU-School of Music department.

MUSC461 Theory and Analysis of Atonal and Twelve-tone Music (3 Credits)
An advanced technical introduction to theory and analysis of atonal and twelve-tone music, with an emphasis on music by Schoenberg, Webern, Bartok, and Stravinsky.
Prerequisite: MUSC251 and MUSC450; and permission of ARHU-School of Music department.
Restriction: Must be in Music Theory and Composition program. Also offered as: MUSC661.
Credit Only Granted for: MUSC461 or MUSC661.

MUSC463 Technology and a Career in Music (3 Credits)
A hands-on introduction to technology as it applies to music creation and recording. Digital audio workstations, music notation software, and cloud-based music technology are used to create and manipulate musical examples with an eye toward their practical applications for professional musicians.
Recommended: Ability to read music on a grand staff (treble and bass clef).
Additional Information: No previous experience with technology is required.

MUSC464 The Theories of Heinrich Schenker (3 Credits)
An advanced analysis course in tonal music with specific emphasis on the theories of the early 20th century theorist Heinrich Schenker. Specific analyses of music by Bach, Mozart, Haydn, Beethoven, Chopin, and Brahms.
Prerequisite: MUSC251 and MUSC450; and permission of ARHU-School of Music department.
Restriction: Must not have completed MUSC651.
Credit Only Granted for: MUSC464 or MUSC651.

MUSC467 Piano Pedagogy I (3 Credits)
A study of major pedagogical treatises in music, and an evaluation of pedagogical techniques, materials, and procedures.
Prerequisite: Permission of ARHU-School of Music department.

MUSC468 Piano Pedagogy II (3 Credits)
Application of the studies begun in MUSC467 to the actual lesson situation. Evaluation of results.
Prerequisite: MUSC467; and permission of ARHU-School of Music department.
Repeatable to: 6 credits.

MUSC469 Orchestral Excerpts for String Players (1 Credit)
In-depth study of the orchestral excerpts required for professional orchestra auditions.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: MUSC469, MUSC448B, MUSC448Q, MUSC448V, or MUSC448X.
Formerly: MUSC448B, MUSC448Q, MUSC448V, and MUSC448X.

MUSC470 Harmonic and Contrapuntal Practices of the Twentieth Century (3 Credits)
A theoretical and analytical study of twentieth century materials.
Prerequisite: MUSC251; or students who have taken courses with comparable content may contact the department. And permission of ARHU-School of Music department.

MUSC471 Contemporary Compositional Techniques (3 Credits)
Continuation of MUSC470, with emphasis on the analysis of individual works written since 1945.
Prerequisite: MUSC470; and permission of ARHU-School of Music department.

MUSC481 Music in the Renaissance (3 Credits)
Survey of western music from 1450 to 1600.

MUSC483 Music in the Classic Era (3 Credits)
Survey of western music from 1750 to 1820.

MUSC484 Music in the Romantic Era (3 Credits)
Survey of western music from 1820 to 1900.

MUSC485 Music in the 20th Century (3 Credits)
Survey of western music from 1900 to the present.
Prerequisite: Permission of ARHU-School of Music department.

MUSC486 Orchestration I (3 Credits)
A study of the ranges, musical functions and technical characteristics of the instruments and their color possibilities in various combinations. Practical experience in orchestrating for small and large ensembles.
Prerequisite: MUSC251; and permission of ARHU-School of Music department.

MUSC490 Conducting (2 Credits)
Vocal and instrumental baton techniques.
Prerequisite: MUSC251.

MUSC491 Conducting II (2 Credits)
Baton techniques applied to score reading, rehearsal techniques, tone production, style and interpretation.
Prerequisite: MUSC490; or students who have taken courses with comparable content may contact the department.

MUSC492 Keyboard Music I (3 Credits)
The history and literature of harpsichord and solo piano music from its beginning to the romantic period. Emphasis is placed on those segments of repertory which are encountered in performance and teaching situations at the present time.
Prerequisite: Permission of ARHU-School of Music department.

MUSC493 Keyboard Music II (3 Credits)
The history and literature of harpsichord and solo piano music from the Romantic period to the present. Emphasis is placed on those segments of repertory which are encountered in performance and teaching situations at the present time.
Prerequisite: MUSC492; and permission of ARHU-School of Music department.

MUSC499 Independent Studies (1-3 Credits)
Independent research on a topic chosen in consultation with the instructor, which may culminate in a paper or appropriate project.
Prerequisite: Permission of ARHU-School of Music department.
Additional Information: May be repeated once for credit.

MUSC601 Advanced English Lyric Diction (1 Credit)
Concepts, strategies and techniques for singing operatic, oratorio and song literature in English: stress patterns, linkage, stressed and non stressed vowels, dipthongs, placement of consonants and vowels, and communication of text with emphasis on current performance practices. Use of the International Phonetic Alphabet (IPA) will be stressed.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) . And permission of instructor; or admission to graduate voice program.

MUSC602 Advanced Italian Lyric Diction (1 Credit)
Concepts, strategies and techniques for singing operatic and song literature in Italian: syllabification, vowels, stressed and unstressed syllables, dipthongs, glides and elisions, single and double consonants with emphasis on current performance practices.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) . And permission of instructor; or admission to graduate voice program.

MUSC603 Advanced German Lyric Diction (1 Credit)
Concepts, strategies and techniques for singing operatic and song literature in German: single and double consonants, the use of the glottal, the German closed (e) and (o) vowels, the "schwa" and consonant clusters. Mastery of the International Phonetic Alphabet (IPA) as it applies to "Hochdeutsch" will be expected.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) . And permission of instructor; or admission to graduate voice program.

MUSC604 Advanced French Lyric Diction (1 Credit)
Concepts, strategies and techniques for singing operatic and song literature in French: phoneticization, formation and singing of the vowel-sounds, semi-consonants, and consonants; the liaison; legato singing in French; the hiatus, mute and aspirate 'h'; stress and word rhythm. Use of the International Phonetic Alphabet (IPA) will be stressed.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) . And permission of instructor; or admission to graduate voice program.

MUSC605 Opera Repertory I (1 Credit)
Advanced vocal coaching of selections from the Italian, French, German, and English opera repertory: musical accuracy; language facility; diction clarity; and dramatic interpretation.
Prerequisite: MUSC602; or permission of instructor.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)).

MUSC606 Opera Repertory II (1 Credit)
Continuation of MUSC 605. Advanced vocal coaching of selections from the Italian, French, German and English opera repertory: musical accuracy, language facility; diction clarity; and dramatic interpretation.
Prerequisite: MUSC605; or permission of instructor.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)).

MUSC608 Chamber Music Repertory (1-3 Credits)
Prerequisite: graduate standing as a major in performance. A study, through performance, of diversified chamber music for standard media.
Repeatable to: 99 credits.
Additional Information: May be repeated for credit to the maximum credit designated in the student's major degree program.

MUSC609 Piano Chamber Music Practicum and Analysis (2 Credits)
Study of repertoire written for piano in duos or with several instruments, to develop an accompanists advanced performance skills in listening, balance, nuance in dynamics, harmonic motion and phrasing.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 4 credits.

MUSC610 Research Methods, Bibliography, and Guided Writings (3 Credits)
Survey of bibliographic material in ethnomusicology. Guided writing utilizing specific bibliography.

MUSC611 Opera Techniques I (2 Credits)
Techniques for opera performance: Improvisation; Acting I, Scene Study I; and Movement I. Practical application of styles and techniques to operatic repertoire.
Corequisite: MUSC601.
Restriction: Permission of director of opera; and must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)).

MUSC612 Opera Techniques II (2 Credits)
Continuation of MUSC 611. Techniques for opera performance: Scene Study II; Movement II; and Mask.
Prerequisite: Minimum grade of B- in MUSC611.
Corequisite: MUSC602.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) ; and permission of Director of Opera required.

MUSC613 Opera Techniques III (2 Credits)
Continuation of MUSC 612. Techniques for opera performance: Scene Study III; Movement III; and Shakespeare.
Prerequisite: Minimum grade of B- in MUSC612; and permission of Director of Opera required.
Corequisite: MUSC603 and MUSC605.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)).

MUSC614 Opera Techniques IV (2 Credits)
Continuation of MUSC 613. Techniques for opera performance: Scene Study IV and Movement IV.
Prerequisite: Minimum grade of B- in MUSC613.
Corequisite: MUSC606 and MUSC604.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) ; and permission of Director of Opera required.

MUSC620 Analysis of World Music (3 Credits)
Development of skills for auditory analysis of diverse musical systems.
Recommended: Completion of a seminar in transcription.

MUSC629 Ensemble (1 Credit)
Rehearsal and performance of selected works for small and large instrumental ensembles.
Repeatable to: 36 credits.

MUSC631 Seminar in Organology (3 Credits)
Advanced study of musical instruments of the world, their morphology, musical and cultural function.
Restriction: Permission of ARHU-School of Music department.

MUSC632 The Anthropology of Music (3 Credits)
Explores how leading theoretical paradigms in socio-cultural anthropology have been incorporated into and shaped ethnomusicological research.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET650 or MUSC632.
Formerly: MUET650.

MUSC633 Field Methods in Ethnomusicology I (3 Credits)
Introduction to a wide variety of methods and strategies for surveying, interviewing, and observing the dynamics of performance in contrasting settings. This is the first of three semesters of field methods.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET660 or MUSC633.
Formerly: MUET660.

MUSC634 Field Methods in Ethnomusicology II (3 Credits)
Advanced training in field research techniques and issues including multimedia recording and data management, interview and survey techniques, grant writing, and research ethics.
Prerequisite: MUSC660.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET661 or MUSC634.
Formerly: MUET661.

MUSC636 Field Methods in Ethnomusicology III (3 Credits)
Continuation of Field Methods in Ethnomusicology II. Further development of skills in data collection and interpretation, culminating in an urban musical ethnography project and document.
Prerequisite: MUSC634.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET662 or MUSC636.
Formerly: MUET662.

MUSC639 Seminar in Music (3 Credits)
The work of one major composer (Bach, Beethoven, etc.) will be studied.
Prerequisite: MUSC330 and MUSC331.
Restriction: Permission of instructor.
Repeatable to: 99 credits if content differs.

MUSC642 Early Music Notation (3 Credits)
Aspects of notation in music before 1600; transcription into modern notation.

MUSC643 Seminar in Solo Vocal Literature I (3 Credits)
An intensive study of solo vocal literature from its origin to the present.
Prerequisite: MUSC443; or students who have taken courses with comparable content may contact the department.

MUSC644 Seminar in Solo Vocal Literature II (3 Credits)
A continuation of MUSC 643 with an emphasis on areas of individual interest.
Prerequisite: MUSC643; or students who have taken courses with comparable content may contact the department.

MUSC645 Seminar in Vocal Pedagogy (3 Credits)
A study of the physiological, psychological and acoustical aspects of the teaching of singing combined with independent study and research in areas of individual interest.
Prerequisite: MUSC400; or students who have taken courses with comparable content may contact the department.

MUSC646 Introduction to Musicology (3 Credits)
An introduction to the basics of musicological research, including sources, methodologies, and techniques, as well as the fundamentals of both academic and non-academic writing.
Prerequisite: Graduate student standing in in the School of Music.
Credit Only Granted for: MUSC648 or MUSC646.

MUSC648 Seminar in Music Research (3 Credits)
An introduction to graduate study in the history and literature of music. Bibliography and methodology of systematic and historical musicology.
Prerequisite: MUSC331.

MUSC649 Ensemble (1 Credit)

MUSC651 The Theories of Heinrich Schenker (3 Credits)
The analytical methods of Heinrich Schenker with application of those theories to musical literature from the Baroque, Classical and Romantic periods.
Prerequisite: MUSC450; or permission of ARHU-School of Music department.

MUSC653 Jazz Improvisation I (3 Credits)
Study of improvisational techniques and historical styles of jazz, including study of jazz "language" through transcription and analysis of recorded solos, and the exploration of creative processes and philosophical concepts.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC653 or MUSC699Z.
Formerly: MUSC699Z.

MUSC654 Jazz Improvisation II (3 Credits)
Continuation of MUSC653, study of jazz improvisation techniques through analysis, transcription and composition.
Prerequisite: MUSC653.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC654 or MUSC699Z.
Formerly: MUSC699Z.

MUSC655 Theory of Jazz (3 Credits)
Analysis of jazz harmony, with emphasis on principles of substitution, reharmonization, and syntax. Topics may also include chord/scale relationships, phrasing, articulation, notation and orchestration.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC655 ir MUSC699J.
Formerly: MUSC699J.

MUSC656 Jazz Arranging (3 Credits)
Comprehensive approach to jazz arranging, including chord scale theory, voicing techniques, part and score layout, and formal construction of an arrangement.
Prerequisite: MUSC655.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC656 or MUSC699N.
Formerly: MUSC699N.

MUSC658 Seminar in Advanced Analysis (3 Credits)
Individual analytical projects including computer music, non-western music and advanced Schenkerian analysis. Readings regarding form, structure and analytical methods.
Prerequisite: MUSC651, MUSC451, and MUSC471; or permission of ARHU-School of Music department.
Repeatable to: 6 credits if content differs.

MUSC659 Seminar in Repertoire and Pedagogy (2-3 Credits)
Analysis and preparation of choral master works from all major style periods for the purpose of successful rehearsal and performance by conductors.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC659 or MUSC699R.
Formerly: MUSC699R.

MUSC660 String Pedagogy (3 Credits)
A study of major string pedagogical treatises, and an evaluation of string pedagogical techniques, materials, and procedures.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC400S or MUSC660.

MUSC661 Theory and Analysis of Atonal and Twelve-Tone Music (3 Credits)
An introduction to the advanced theoretical literature in atonal and twelve-tone music with an emphasis on analytical applications to music by prominent 20th-century composers.
Prerequisite: MUSC450; or permission of ARHU-School of Music department. Also offered as: MUSC461.
Credit Only Granted for: MUSC461 or MUSC661.

MUSC665 Theory in Analysis (3 Credits)
An advanced study of the philosophy, practice, and aesthetics of music analysis in contemporary music thoery. Readings drawn from the theoretic literature from 1960 to the present emphasize standards for discourse, the objects of music analysis, rationales for interpretation, and the role that theories of musical structure play in analytic practice.
Prerequisite: MUSC445; or permission of ARHU-School of Music department.
Restriction: Must not have completed MUSC465.
Credit Only Granted for: MUSC465, MUSC665, or MUSC699T.
Formerly: MUSC699T.

MUSC669 Orchestral Excerpts for String Players (1 Credit)
In-depth study of the orchestral excerpts required for professional orchestra auditions.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 6 credits.
Credit Only Granted for: MUSC669, MUSC699B, MUSC699L, MUSC699Q, or MUSC699X.
Formerly: MUSC699B,MUSC699L,MUSC699Q,and MUSC699X.

MUSC670 Advanced Analytical Techniques I (3 Credits)
Analysis of representative masterpieces of the eighteenth and early nineteenth centuries.
Prerequisite: MUSC451; or permission of ARHU-School of Music department.

MUSC671 Advanced Analytical Techniques II (3 Credits)
Analysis of representative masterpieces of the nineteenth and early twentieth centuries.
Prerequisite: MUSC451; or permission of ARHU-School of Music department.

MUSC672 Masterworks of the 20th Century: 1900-1950 (3 Credits)
A comprehensive survey of Western Art-Music of the first half of the 20th Century with a more intensive study and analysis of composers who have had a profound influence in the development of compositional practice in the modern era.
Restriction: Permission of ARHU-School of Music department; and must not have completed MUSC470.
Credit Only Granted for: MUSC448M, MUSC470, MUSC672, or MUSC699M.
Formerly: MUSC699M.

MUSC673 Style Analysis (3 Credits)
An analytical study of musical style from the Middle Ages to present through analysis of selected compositions. The principle genres and composers of Medieval, Renaissance, Baroque, Classical, Romantic and 20th century music will be covered.
Prerequisite: MUSC251; and permission of ARHU-School of Music department.
Restriction: Must not have completed MUSC448.
Credit Only Granted for: MUSC673, MUSC448F, or MUSC699F.
Formerly: MUSC699F.

MUSC675 Music Theory Pedagogy (3 Credits)
Analysis of introductory level music theory courses, evaluation of text materials, and teaching approaches for music fundamentals, aural training, and basic undergraduate theory programs.

MUSC676 Historical Theory and Method in Ethnomusicology (3 Credits)
Reading and discussion of major works in ethnomusicology, with emphasis on schools of thought, convergence with and divergence from musicology and systematic musicology; close examination of trends in methodology and theory from the mid-eighteenth century until approximately thirty years before the present.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET675 or MUSC676.
Formerly: MUET675.

MUSC677 Current Theory and Method in Ethnomusicology (3 Credits)
Reading and discussion of major works in ethnomusicology, with emphasis on a close examination of trends in methodology and theory from approximately twenty years before the present to current work in both areas. Current work in all geographic areas will be reviewed and analyzed.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET676 OR MUSC677.
Formerly: MUET676.

MUSC678 Seminar in Musical Composition (3 Credits)
An advanced course in musical composition. May be repeated for credit.

MUSC679 Seminar in Ethnomusicology (3 Credits)
Seminar topics address current issues, including gender, the social economy of music, ethnography of performance, etc.
Repeatable to: 9 credits if content differs.
Formerly: MUET679.

MUSC680 Seminar in Music of Antiquity and the Middle Ages (3 Credits)
Research topics in music from antiquity to 1450.

MUSC682 Seminar in Music of the Baroque Era (3 Credits)
Seminar in music of the Baroque era. Research topics in music from 1600 to 1750.

MUSC683 Seminar in Music of the Classic Era (3 Credits)
Seminar in music of the Classic era. Research topics in music from 1750 to 1820.

MUSC684 Seminar in Music of the Romantic Era (3 Credits)
Seminar in music of the Romantic era. Research topics in music from 1820 to 1900.

MUSC685 Seminar in Music of the 20th Century (3 Credits)
Seminar in music of the twentieth century. Research topics in music from 1900 to the present.

MUSC688 Advanced Orchestration (3 Credits)
Orchestration projects in the styles of Debussy, Ravel, Stravinsky, Schoenberg, Bartok, and others.
Prerequisite: MUSC487; or students who have taken courses with comparable content may contact the department.
Additional Information: May be repeated once for credit.

MUSC689 Advanced Conducting (2 Credits)
A concentrated study of the conducting techniques involved in the repertoire of all historical periods.
Prerequisite: MUSC491; or students who have taken courses with comparable content may contact the department.
Additional Information: May be repeated for credit with permission of instructor.

MUSC698 Advanced Seminar in Ethnomusicology (3 Credits)
Advanced Seminar on topics that change every semester. Requires well-developed skills in musical and social analysis, mastery of theories and methods of ethnomusicology.
Prerequisite: Permission of ARHU-School of Music department.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: MUET689 or MUSC698.
Formerly: MUET689.

MUSC699 Selected Topics in Music (1-3 Credits)

MUSC757 Aural Skills for Conductors (1 Credit)
Advanced musicianship skills necessary for conductors.
Restriction: Permission of ARHU-School of Music department.

MUSC758 Advanced Aural Skills for Conductors (1 Credit)
Continuation of MUSC757, advanced aural skills necessary for conductors.
Prerequisite: MUSC757.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 4 credits.

MUSC799 Master's Thesis Research (1-6 Credits)

MUSC800 Advanced Seminar in Music Pedagogy (3 Credits)
A detailed study of historical and contemporary methods of pedagogy, and analysis of pedagogical problems. Sectioning by instrument. Required of all candidates for the D.M.A. Degree in performance and literature.
Prerequisite: MUSC400; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.

MUSC801 Advanced Seminar in Music Pedagogy (3 Credits)
A detailed study of historical and contemporary methods of pedagogy, and analysis of pedagogical problems. Sectioning by instrument. Required of all candidates for the D.M.A. Degree in performance and literature.
Prerequisite: MUSC400; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.

MUSC802 Advanced Seminar in Music Pedagogy III (3 Credits)
A detailed study of historical and contemporary methods of pedagogy, and analysis of pedagogical problems. Sectioning by instrument.
Prerequisite: MUSC801.
Restriction: Permission of ARHU-School of Music department.

MUSC811 Doctoral Opera Techniques (2 Credits)
Techniques for opera performance: Improvisation; Acting I, Scene Study I; and Movement I. Practical application of styles, techniques to operat e repertoire, and methodology seminar.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC611 or MUSC811.

MUSC812 Doctoral Opera Techniques II (2 Credits)
Continuation of MUSC811. Techniques for opera preformance: Scene Study II; Acting II; Movement II: Stage Combat I; and Mask; and methodology seminar.
Prerequisite: MUSC811; and permission of ARHU-School of Music department.
Credit Only Granted for: MUSC612 or MUSC812.

MUSC813 Doctoral Opera Techniques III (2 Credits)
Continuation of MUSC812. Techniques for opera performance: Scene Study III; Movement III; Acting III Shakespeare; Dance I; Stage Combat II; Stage Combat II; and methodology seminar.
Prerequisite: MUSC812; and permission of ARHU-School of Music department.
Credit Only Granted for: MUSC613 and MUSC813.

MUSC814 Doctoral Opera Techniques IV (2 Credits)
Continuation of MUSC813. Techniques for opera performance: Scene Study IV; Dance II; Movement IV; and methodology seminar.
Prerequisite: MUSC813; and permission of ARHU-School of Music department.
Credit Only Granted for: MUSC614 or MUSC814.

MUSC830 Doctoral Seminar in Music Literature (3 Credits)
An analytical survey of the literature of music: keyboard music; vocal music; string music; wind instrument music; required of all candidates for the D.M.A. Degree in literature-performance.
Prerequisite: Must have completed at least twelve hours in music history and literature.

MUSC831 Doctoral Seminar in Music Literature (3 Credits)
An analytical survey of the literature of music: keyboard music; vocal music; string music; wind instrument music. Required of all candidates for the D.M.A. Degree in literature-performance.
Prerequisite: MUSC830; or permission of ARHU-School of Music department.

MUSC832 Doctoral Seminar in Music Literature (3 Credits)
An analytical survey of the literature of music: keyboard music; vocal music; string music; wind instrument music.
Prerequisite: MUSC831.
Restriction: Permission of ARHU-School of Music department.

MUSC878 Advanced Composition (3 Credits)
Conference course in composition in the larger forms.
Prerequisite: MUSC678; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

MUSC898 Pre-Candidacy Research (1-8 Credits)

MUSC899 Doctoral Dissertation Research (1-8 Credits)

MUSP - Music Performance

MUSP609 Interpretation and Repertoire (2 Credits)

MUSP610 Graduate Music Performance (4 Credits)

MUSP619 Interpretation and Repertoire (2-4 Credits)
Prerequisite: departmental audition and permission of Department Chairman. Repeatable to a maximum of 12 credits.
Restriction: Must complete a Departmental audition; and permission of ARHU-School of Music department.

MUSP620 Graduate Music Performance (4 Credits)
Prerequisite: MUSP 619 and permission of Department Chairman. Recital course in the major series.
Prerequisite: MUSP619.
Restriction: Permission of ARHU-School of Music department.

MUSP621 Interpretation, Repertoire, and Performance (2-4 Credits)
Private music instruction in preparation for public performance.
Prerequisite: MUSP619.
Corequisite: MUSC758.
Restriction: Permission of ARHU-School of Music department.

MUSP679 Practicum (1 Credit)
Private individual instruction on a secondary instrument.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 4 credits.

MUSP719 Interpretation and Repertoire (2-4 Credits)
Prerequisite: departmental audition, admission to doctoral program in the major series and permission of department chairman. Repeatable to a maximum of 12 credits.
Restriction: Must complete a Departmental audition; and must be in the doctoral program in the major series; and permission of ARHU-School of Music department.

MUSP815 Interpretation, Performance, and Pedagogy (4 Credits)
A seminar in pedagogy and the pedagogical literature for the doctoral performer, with advanced instruction at the instrument, covering appropriate compositions. Required of all candidates for the D.M.A. Degree in literature-performance. Prerequisite: doctoral standing in performance and permission of department chairman. Recital course.
Restriction: Must have Doctoral standing in performance; and permission of ARHU-School of Music department.

MUSP816 Interpretation, Performance, and Pedagogy (4 Credits)
Recital course. Prerequisite: MUSP 815 and permission of Department Chairman.
Prerequisite: MUSP815.
Restriction: Permission of ARHU-School of Music department.

MUSP817 Interpretation, Performance, and Pedagogy (4 Credits)
Recital course. Prerequisite: MUSP 816 and permission of Department Chairman.
Prerequisite: MUSP816.
Restriction: Permission of ARHU-School of Music department.

MUSP898 Pre-Candidacy Research (1-8 Credits)

MUSP899 Doctoral Dissertation Research (1-8 Credits)

NACS - Neuroscience & Cognitive Science

NACS600 Ethics in Scientific Research (2 Credits)
Issues of scientific integrity with emphasis on investigators in the laboratory sciences, including mentoring, scientific record keeping, authorship and peer review, ownership of data, use of animals and humans in research, and conflict of interest.
Prerequisite: Must have completed a year of graduate study.
Restriction: Permission of instructor; and must be in Neurosciences and Cognitive Sciences (Doctoral) program.
Credit Only Granted for: NACS600, PSYC788B, or BIOL600.

NACS608 Neuroscience and Cognitive Science Seminar (1 Credit)
Special seminar topics in Neuroscience and Cognitive Science.
Restriction: Permission of instructor.
Repeatable to: 8 credits if content differs.

NACS640 Foundational Readings Seminar (2 Credits)
An introduction to the breadth of research in Neuroscience and Cognitive Science. Faculty will present papers to provide historical context and introduction to important issues in the fields of their research.
Restriction: Permission of instructor; and must be in Neurosciences and Cognitive Sciences (Doctoral) program.
Credit Only Granted for: NACS640 or NACS728R.
Formerly: NACS728R.

NACS641 Introduction to Neurosciences (4 Credits)
Detailed examination of neurophysiology and sensorimotor systems.
Restriction: Permission of instructor.

NACS642 Cognitive Neuroscience (4 Credits)
A study of the fundamental concepts and techniques of cognitive neuroscience. Hands-on experience with three critically different cognitive neuroscience methods: EEG, MEG, and fMRI.

NACS643 Computational Neuroscience (4 Credits)
Provides a mathematical foundation in computational neuroscience.
Prerequisite: NACS641; and must have completed a course in calculus; and permission of instructor.

NACS644 Cellular and Molecular Neuroscience (4 Credits)
Overview of insights into the molecular mechanisms underlying the structure and function of the nervous system.
Prerequisite: NACS641; or permission of instructor.

NACS645 Cognitive Science (4 Credits)
A study of mental representations and computations. Issues examined include computation, representations, decisions, modularity, evolution, innateness, and reductionism.
Credit Only Granted for: NACS645 or NACS728Y.
Formerly: NACS728Y.

NACS728 Selected Topics in Neuroscience and Cognitive Science (2-4 Credits)
Graduate seminar on selected topics in contemporary neuroscience and Cognitive science. Extensive readings from the primary literature. Topics vary by semester.
Restriction: Permission of BSOS-Dean-Neuroscience and Cognitive Science.
Repeatable to: 15 credits if content differs.

NACS798 Master's Non-Thesis Research (1-3 Credits)
Individual research course for NACS non-thesis MS degree
Restriction: Must be in Neurosciences and Cognitive Sciences (Doctoral) program.
Repeatable to: 6 credits.

NACS799 Master's Thesis Research (1-3 Credits)
Individualized research course for NACS thesis MS degree
Restriction: Must be in Neurosciences and Cognitive Sciences (Doctoral) program.
Repeatable to: 6 credits.

NACS898 Pre-Candidacy Research (1-8 Credits)

NACS899 Doctoral Dissertation Research (1-8 Credits)
Indivdual instruction course: contact department or instructor to obtain section number
Restriction: Must be in Neurosciences and Cognitive Sciences (Doctoral) program.

NAVY - Navy

NAVY400 Naval Operations and Seamanship (3 Credits)
Capstone course for senior NROTC Navy-option midshipmen in advanced navigation, communications, naval operations, and naval warfare. Students learn through simulation in a computer classroom known as the Maritime Skills Simulator (MSS), in addition to lectures, discussions, and qualitative and quantitative tests/examinations. Students will engage in discussions regarding the moral and ethical responsibilities or military leaders, as well as the essential attributes of character required for effective leadership.
Recommended: NAVY201.
Restriction: Permission of UGST-Navy ROTC.
Additional Information: Priority enrollment will be given to students enrolled in the NROTC program.

NAVY401 Leadership and Ethics (3 Credits)
Integrates an intellectual exploration of Western moral traditions and ethical philosophy with military leadership, core values, the Uniform Code of Military Justice, and Navy regulations. The course provides students with a basic understanding of major moral traditions including Relativism, Utilitarianism, Kantian Ethics, Natural Law Theory, Divine Command Theory, and Virtue Ethics.
Recommended: NAVY200.
Restriction: Permission of UGST-Navy ROTC.
Additional Information: Priority enrollment will be given to students enrolled in the NROTC program.

NAVY402 Fundamentals of Maneuver Warfare (3 Credits)
A detailed study of the characteristics of modern warfare and their interactions with maneuver warfare doctrine, with a focus on the United States Marine Corps. Throughout the course, there is a strong focus on leadership, as the fundamental purpose of this course is to develop the skills, knowledge, leadership background and mentality necessary for a successful future leadership and service, whether in the military or the civilian sector.
Recommended: NAVY100, NAVY101, NAVY200, and NAVY108.
Restriction: Permission of UGST-Navy ROTC.
Additional Information: Priority in enrollment will be given to students in the NROTC program.

NFSC - Nutrition and Food Science

NFSC412 Food Processing Technology (4 Credits)
Provides in-depth study of the major industrial modes of food preservation. It integrates aspects of the biology, microbiology, biochemistry and engineering disciplines as they relate to food processing technology and food science.
Prerequisite: CHEM241, CHEM242, NFSC431, NFSC414, and NFSC434.
Corequisite: NFSC421 and NFSC423.
Recommended: MATH120; or completion of MATH220 recommended.

NFSC414 Mechanics of Food Processing (4 Credits)
Applications in the processing and preservation of foods, of power transmission, hydraulics, electricity, thermodynamics, refrigeration, instruments and controls, materials handling and time and motion analysis.
Prerequisite: PHYS121.
Credit Only Granted for: ENBE414 or NFSC414.
Formerly: ENBE414.

NFSC421 Food Chemistry (3 Credits)
Basic chemical and physical concepts are applied to the composition and properties of foods. Emphasis on the relationship of processing technology to the keeping quality, nutritional value, and acceptability of foods.
Prerequisite: BCHM461.

NFSC422 Food Product Research and Development (3 Credits)
A capstone course for FDSC majors. A study of the research and development of new food products. Application of food technology, engineering, safety and packaging are integrated by teams of students to develop a new food product from concept to pilot plant scale-up. Students will travel to nearby food processing plants on two to four Saturdays during the semester.
Restriction: Senior standing; and must be in a major within AGNR-Nutrition and Food Science department; and permission of AGNR-Nutrition and Food Science department.
Formerly: FDSC422.

NFSC423 Food Chemistry Laboratory (3 Credits)
Analysis of the major and minor constituents of food using chemical, physical and instrumental methods in concordance with current food industry and regulatory practices. Laboratory exercises coincide with lecture subjects in NFSC421.
Prerequisite: Must have completed or be concurrently enrolled in NFSC421.

NFSC425 International Nutrition (3 Credits)
Nutritional status of world population; consequences of malnutrition on health and mental development; and local, national, and international programs for nutritional improvement.
Prerequisite: Must have completed one course in basic nutrition.

NFSC430 Food Microbiology (3 Credits)
A study of microorganisms of major importance to the food industry with emphasis on food-borne outbreaks, public health significance, bioprocessing of foods, disease control, and the microbial spoilage of foods.
Prerequisite: BSCI223; or permission of instructor.
Credit Only Granted for: ANSC430 or NFSC430.
Formerly: FDSC430.

NFSC431 Food Quality Control (4 Credits)
Definition and organization of the quality control function in the food industry; preparation of specifications; statistical methods for acceptance sampling; in-plant and processed product inspection. Instrumental and sensory methods for evaluating sensory quality, identity and wholesomeness and their integration into grades and standards of quality. Statistical Process Control (SPC).

NFSC434 Food Microbiology Laboratory (3 Credits)
A study of techniques and procedures used in the microbiological examination of foods.
Prerequisite: Must have completed or be concurrently enrolled in NFSC430.
Credit Only Granted for: NFSC434 or ANSC434.
Formerly: FDSC434.

NFSC440 Advanced Human Nutrition (4 Credits)
A critical study of physiologic, molecular and metabolic influences on utilization of carbohydrates, lipids, proteins, vitamins, macro-and micro-minerals, and nonnutritive components of food. Interactions of these nutrients and food components will be examined relative to maintaining health.
Prerequisite: BCHM462, BSCI440, and NFSC100; and permission of AGNR-Nutrition and Food Science department.

NFSC450 Food and Nutrient Analysis (3 Credits)
Methods and practices of the analysis of foods and nutrients. An overview of the principles and basic mechanisms used in many of the analytical procedures commonly used in food and nutrition research. Emphasis will be placed on hands-on development of skills necessary to complete each analytical procedure; and on the accurate and concise description of the methodology and results from their application and on the regulations governing food analysis for nutritional labeling.
Prerequisite: BCHM461 and NFSC100.
Formerly: NUTR450.

NFSC460 Medical Nutrition Therapy (4 Credits)
Modifications of the normal adequate diet to meet human nutritional needs in acute and chronic diseases and metabolic disorders.
Prerequisite: NFSC380 and NFSC440; and permission of AGNR-Nutrition and Food Science department.
Formerly: NUTR460.

NFSC470 Community Nutrition (3 Credits)
Perspectives underlying the practice of nutrition services in community settings. Assessment of needs, program planning and evaluation. Programs and strategies to meet nutrition needs outside the acute care setting, such as nutrition education and food assistance. National nutrition policy and federal initiatives in nutrition will be examined. Students will be required to travel to local community nutrition sites during the semester.
Prerequisite: NFSC315; and permission of AGNR-Nutrition and Food Science department.
Formerly: NUTR470.

NFSC490 Special Problems in Nutrition (2-3 Credits)
Individually selected problems in the area of human nutrition.
Prerequisite: NFSC440; and permission of AGNR-Nutrition and Food Science department.

NFSC491 Issues and Problems in Dietetics (3 Credits)
A capstone course for dietetics majors. Students will integrate knowledge and theory of nutrition, food, management, psychology, and social behaviors necessary to support quality dietetic practice. Working in teams, students will participate in case studies, simulated situations and community projects. Individuals and groups will present cases as well as papers on published research.
Prerequisite: NFSC350; and permission of AGNR-Nutrition and Food Science department.
Corequisite: NFSC460.
Restriction: Senior standing or higher; and must be in Nutrition and Food Science: Dietetics program.

NFSC498 Selected Topics (1-3 Credits)
Selected current aspects of food.
Restriction: Permission of AGNR-Nutrition and Food Science department.
Repeatable to: 6 credits if content differs.

NFSC605 Food-Related Behavior of the Individual (3 Credits)
Examination of the factors that influence food-related behavior and of the research methods used.
Restriction: Permission of AGNR-Nutrition and Food Science department.
Formerly: FOOD670.

NFSC611 Molecular Nutrition: Genomic, Metabolic, and Health Aspects (2 Credits)
The emerging discipline of molecular nutrition encompasses nutritional biochemistry, nutritional genomics, nutritional metabolomics, and epigenetics. It focuses on the effects of diet and nutrients on an individual's genome and metabolism, and how the molecular events affect human health. This is a co-taught course together with National Taiwan University via videoconferencing.
Recommended: BCHM461, NFSC440, or BCHM463.

NFSC620 Diet and Cancer Prevention (3 Credits)
1. The nature of cancer and the relationship between dietary/nutritional factors and incidence of cancer 2. Basic concepts of general cancer biology with focus on effects of dietary components on genes and their encoded proteins, epigenetic changes and cell signaling 3. Effect of dietary factors in various types of cancer with respect to the benefit of intervention strategies for chemoprevention 4. Scientific knowledge, critical thinking, and the practical application of diet in cancer prevention.
Prerequisite: NFSC440; or permission of instructor.
Credit Only Granted for: NFSC620 or NFSC679D.
Formerly: NFSC678D.

NFSC630 Nutritional Aspects of Energy Balance (3 Credits)
The prevalence and basic causes of caloric imbalance, along with a wide variety of approaches to weight control.
Formerly: NUTR630.

NFSC631 Advanced Food Microbiology (3 Credits)
One lecture and one laboratory period a week. An in-depth understanding and working knowledge of a selected number of problem areas and contemporary topics in food microbiology.
Prerequisite: NFSC430.
Restriction: Permission of instructor.

NFSC633 Food Polymer Science (3 Credits)
Food polymers including protein and carbohydrate from food, and their chemical, physical, and functional properties together with their structure-function relationship will be discussed. Food polymer applications in food and non-food areas will be covered. Principles and applications of instrumental methods for polymer characterization will be introduced. An emphasis on nanotechnology and its application to design and characterization food polymers will be included.
Prerequisite: Permission of instructor.
Credit Only Granted for: NFSC633 or NFSC679P.
Formerly: NFSC679P.

NFSC650 Nutrition and Public Health (2 Credits)
Overview of the major policy debates involving nutrition and health in the U.S. Public Health System associated with nutrition, chronic disease and nutrition lifestyle stages will be discussed. The CDCynergy software program will facilitate the development of program design, implementation and evaluation skills.
Prerequisite: NFSC470.
Restriction: Permission of AGNR-Nutrition and Food Science department.

NFSC655 Nutrition, Food and Public Policy (3 Credits)
History and current status of legislation relative to nutrition and food. Focus on gaining insights and skills regarding working effectively in the area of nutrition and policy.
Formerly: NUTR655.

NFSC660 Research Methods (3 Credits)
A study of appropriate research methodology and theories including experimental design. Each student is required to develop a specimen research proposal.
Prerequisite: Must have completed one statistics course.
Formerly: NUTR 660.

NFSC675 Nutritional Epidemiology (3 Credits)
Discussion of definition, history, relevance, and application of nutritional epidemiology to national and international nutrition problems. Exposure to skills and methodological tools used in nutritional epidemiology. Practical examples of epidemiologic studies also performed.
Prerequisite: NFSC440.
Corequisite: BIOM602.
Formerly: NUTR675.

NFSC678 Selected Topics in Nutrition (1-6 Credits)
Individual or group study in an area of nutrition.
Repeatable to: 6 credits.
Formerly: NUTR678.

NFSC679 Selected Topics in Food Science (1-6 Credits)
Individual or group study in an area of food science.
Repeatable to: 6 credits if content differs.

NFSC680 Human Nutritional Status (3 Credits)
Indirect and direct methods of appraisal of human nutritional status which include: dietary, anthropometric, clinical evaluations and biochemical measures.
Prerequisite: Must have complete coursework in advanced nutrition, biochemistry and physiology.

NFSC688 Seminar in Nutrition and Food Science (1-3 Credits)
This is a seminar course presentedy by NFSC graduate students and invited speakers in the field of nutrition and food science.
Restriction: Must be in a major within AGNR-Nutrition and Food Science department.
Repeatable to: 3 credits.
Formerly: NUTR688.

NFSC690 Nutrition and Aging (3 Credits)
Explore the nutrition needs of older adults and examine the potential impact of the physiological, social and psychological changes that occur with aging on the needs.
Prerequisite: NFSC440 or BSCI440; or students who have taken courses with comparable content may contact the department.

NFSC698 Colloquium in Food Science (1 Credit)
Oral reports on special topics or recently published research in food science and technology. Distinguished scientists are invited as guest lecturers. A maximum of three credits allowed for the M.S.
Formerly: FDSC698.

NFSC699 Problems in Nutrition and Food Science (1-4 Credits)
Credit according to time scheduled and magnitude of problem. An experimental program on a topic other than the student's thesis problem will be conducted. Four credits shall be the maximum allowed toward an advanced degree.
Restriction: Permission of AGNR-Nutrition and Food Science department.
Formerly: FDSC 699 and NUTR 699.

NFSC735 Food Toxicology (3 Credits)
An introduction to basic concepts in toxicology in relation to toxic food contaminants and additives; both synthetic and naturally occurring. Focus on exposure routes, molecular targets and susceptible individuals. Also includes regulatory toxicology with respect food toxins.
Recommended: BCHM462, BSCI440, or CHEM131. Also offered as: MIEH735.
Credit Only Granted for: MIEH735 or NFSC735.

NFSC799 Master's Thesis Research (1-6 Credits)
First and second semesters. Credit in proportion to work done and results accomplished. Investigation in some phases of foodservice administration which may form the basis of a thesis. results in the form of a thesis.
Formerly: FDSC 799, NUSC 799, and NUTR 799.

NFSC898 Pre-Candidacy Research (1-8 Credits)
First and second semesters. Oral reports on special topics or recently published research in nutrition. Distinguished scientists are invited as guest lecturers. A maximum of three credits allowed for the M.S.
Formerly: NUSC898.

NFSC899 Doctoral Dissertation Research (1-8 Credits)

NRMT - Natural Resources Management

PERS - Persian

PERS401 Persian Composition (3 Credits)
A genre approach to writing, focusing on how and why different texts are structured and written as they are. The purpose, context, and intended audience for written communication will guide the writing tasks conducted in and out of class. Students analyze and investigate a variety of purposes and audiences of particular relevance to Persian flagship students. Taught in Persian.
Prerequisite: PERS302; or permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS402 Persian Translation (3 Credits)
Focuses on hands-on practice of English/Persian and Persian/English translation as well as the problematic issues of translation. Taught in Persian.
Prerequisite: PERS302; or permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS405 Media and the Current Issues in Iranian Society (6 Credits)
Develops Persian language proficiency and domain-specific knowledge at advanced-mid to advanced-high level on ACTFL scale. Enhances linguistic and cultural competence. Provides a broad understanding of some of the current social, political and economic issues in modern Iran. Taught in Persian.
Prerequisite: PERS306; or equivalent as determined by FLPT (Foreign Language Placement Test).

PERS406 Practicum in Persian Translation (6 Credits)
Provides opportunities for translation, interpretation, and analysis of various authentic oral and written texts (both English to Persian and Persian to English). Facilitates the development of Persian language proficiency at advanced level through a task-based approach that integrates all the language skills in pedagogical translation activities.
Prerequisite: PERS306; or equivalent as determined by the FLPT (Foreign Language Placement Test).

PERS452 Modern Persian Literature: A Survey (3 Credits)
Surveys development of poetry and prose in the Persian-speaking world in modern times. Periods and genres. Content varies. Mastery of Persian is required.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS498 Special Topics in Persian Studies (3 Credits)
Topic and language to be announced when offered.
Prerequisite: Permission of instructor.
Repeatable to: 9 credits if content differs.

PERS601 Modern Persian Literature (3 Credits)
Selected readings in Persian poetry, fiction and drama covering topics related to contemporary Iranian society and culture. In Persian.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS611 Practicum in Translation and Interpreting (3 Credits)
Analysis, translation, and interpreting of literary, expository, and oral texts, mainly from English to Persian. Focus on interdependence of language, context and culture. In Persian and English.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS641 Iranian Media and International Relations (3 Credits)
Political interests and diplomatic positions of Iran in the contemporary international context as reflected in its print and electronic media. In Persian.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS662 Persian Sociolinguistics (3 Credits)
Study of impact of social and regional factors on spoken and written usage. In Persian.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS689 Special Topics in Persian Studies (3 Credits)
In-depth analysis of a particular aspect of Persian studies. In Persian.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 12 credits if content differs.

PHIL - Philosophy

PHIL408 Topics in Contemporary Philosophy (3 Credits)
An intensive examination of contemporary problems and issues. Source material will be selected from recent books and articles.
Repeatable to: 99 credits if content differs.

PHIL409 Advanced Studies in Contemporary Philosophy (3 Credits)
An in-depth study of a contemporary philosophical problem or issue. Topics will vary, but the course will encourage students to grapple with the primary literature in order to generate sustained critical analyses or proposed resolutions of issues under active consideration in contemporary philosophy.
Prerequisite: 6 credits in PHIL courses.
Repeatable to: 12 credits if content differs.

PHIL412 The Philosophy of Plato (3 Credits)
A critical study of selected dialogues.
Prerequisite: 6 credits in PHIL courses.

PHIL414 The Philosophy of Aristotle (3 Credits)
A critical study of selected portions of Aristotle's writings.
Prerequisite: 6 credits in PHIL courses.

PHIL416 Medieval Philosophy (3 Credits)
A study of philosophical thought from the fourth to the fourteenth centuries. Readings selected from Christian, Islamic, and Jewish thinkers.
Prerequisite: 6 credits in PHIL courses.

PHIL417 The Golden Age of Jewish Philosophy (3 Credits)
Jewish philosophy from Maimonides in the 12th century to the expulsion of the Jews from Spain at the end of the 15th century. Topics include the limitations of human knowledge, creation of the world, foreknowledge and free will, and the existence of God.
Prerequisite: 3 credits in PHIL courses; or permission of ARHU-Philosophy department. Also offered as: JWST452.
Credit Only Granted for: JWST452 or PHIL417.

PHIL418 Topics in Epistemology/Metaphysics (3 Credits)
An intensive examination of contemporary problems and issues in epistemology or metaphysics. Source material will be selected from recent books and articles.
Prerequisite: 2 courses in PHIL.
Repeatable to: 12 credits if content differs.

PHIL424 The Philosophy of Spinoza (3 Credits)
An investigation of the metaphysical, ethical and political thought of the 17th century philosopher Benedict Spinoza.
Prerequisite: 3 credits in PHIL courses; or permission of ARHU-Philosophy department.
Restriction: Must not have completed JWST453. Also offered as: JWST453.
Credit Only Granted for: JWST453 or PHIL424.

PHIL428 Topics in the History of Philosophy (3 Credits)

PHIL431 Aesthetic Theory (3 Credits)
Study of the theory of the aesthetic as a mode of apprehending the world and of the theory of criticism, its conceptual tools and intellectual presuppositions.
Prerequisite: 9 credits in PHIL courses; or permission of ARHU-Philosophy department.

PHIL438 Topics in Value Theory (3 Credits)
An intensive examination of contemporary problems and issues in ethics, aesthetics, political philosophy and related areas. Source material will be selected from recent books and articles.
Prerequisite: 2 courses in PHIL.
Repeatable to: 12 credits if content differs.

PHIL440 Contemporary Ethical Theory (3 Credits)
Contemporary work on fundamental problems in ethical theory, such as whether there are moral truths, whether and how our moral claims can be justified, what exactly makes an act right or wrong, the nature of moral language, and the role of reason and emotion in moral judgment.
Prerequisite: PHIL341; or permission of instructor.

PHIL443 Moral Psychology (3 Credits)
Philosophers often stress reasoning as the appropriate source for practical and moral action. Would a realistic view of human psychology undermine this assumption? This course will examine recent philosophical and empirical work on the relevance of emotion and/or intuition to rationality, moral worth, and moral judgment.
Prerequisite: 2 courses in PHIL.
Recommended: PHIL341 is strongly recommended for background on the historical authors that the readings make reference to.
Credit Only Granted for: PHIL408P or PHIL443.
Formerly: PHIL408P.

PHIL445 Contemporary Political Philosophy (3 Credits)
Major trends in contemporary political philosophy: liberal, libertarian, communitarian, socialist, feminist.
Restriction: Must have completed 3 credits in philosophy or political theory; or permission of ARHU-Philosophy department. And sophomore standing or higher.

PHIL446 Law, Morality, and War (3 Credits)
An exploration of fundamental moral and legal issues concerning war.
Prerequisite: GVPT401 and PHIL341; or permission of ARHU-Philosophy department. Also offered as: GVPT403.

PHIL454 Philosophy of Space and Time (3 Credits)
A non-technical investigation of philosophical issues in the foundations of physics. Topics may include traditional philosophical problems of space and time, metaphysical issues about the nature of particles and fields, and philosophical problems associated with the introduction of probability into physics, such as the problem of irreversibility in thermodynamics and the problem of objectivity in quantum theory.
Prerequisite: 6 credits in PHIL courses.

PHIL456 Philosophy of Biology II (3 Credits)
Questions about concepts, reasoning, explanation, etc., in biology, and their relations to those of other areas of science. Case studies of selected aspects of the history of biology, especially in the twentieth century.
Prerequisite: PHIL256 or PHIL250; or must be Life Science major; or permission of ARHU-Philosophy department.

PHIL458 Topics in the Philosophy of Science (3 Credits)
A detailed examination of a particular topic or problem in philosophy of science.
Repeatable to: 6 credits if content differs.

PHIL469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

PHIL470 Logical Theory (3 Credits)
This course will treat a selection of the most important topics in modern logic: alternative proof-theoretic presentations of logical systems, completeness proofs for classical propositional and first-order logic, some basic computability theory, basic limitative results (such as Godel's incompleteness theorems), and some results concerning second-order logic. The primary focus of the course is a study of these fundamental topics, but we will also discuss some of the philosophical issues they raise.
Prerequisite: PHIL370; or permission of instructor.

PHIL478 Topics in Philosophical Logic (3 Credits)
Methods and results of philosophical logic, the application of logical techniques to the study of concepts or problems of philosophical interest. Content will vary, either treating a particular logical area in detail--such as modal logic, conditional logic, deontic logic, intuitionistic or relevance logic, theories of truth and paradox--or surveying a number of these different areas.
Prerequisite: PHIL370; or permission of instructor.
Recommended: PHIL470.
Repeatable to: 9 credits if content differs.

PHIL488 Topics in Philosophy of Cognitive Studies (3 Credits)
Examination of a particular topic or problem in philosophy of cognitive studies.
Prerequisite: 3 credits in PHIL courses; or permission of ARHU-Philosophy department.
Repeatable to: 9 credits if content differs.

PHIL489 Undergraduate Seminar in Philosophy (3-6 Credits)
An intensive examination of a philosophical topic or topics.
Restriction: Permission of ARHU-Philosophy department.
Repeatable to: 6 credits if content differs.

PHIL498 Topical Investigations (1-3 Credits)

PHIL640 Value Theory (3 Credits)
A basic course in value theory for beginning graduate students, covering a number of topics in depth, to provide a springboard for further study and research in the area.

PHIL660 Metaphysics, Mind, and Language (3 Credits)
A basic course on selected issues in metaphysics, philosophy of mind, and philosophy of language for beginning graduate students, covering a number of topics in depth, to provide a springboard for further study and research in the area.

PHIL688 Selected Problems in Philosophy (1-3 Credits)

PHIL788 Research in Philosophy (1-6 Credits)

PHIL798 Master's Level Independent Study (1-3 Credits)
Master's level independent study.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

PHIL799 Master's Thesis Research (1-6 Credits)

PHIL808 Seminar in the Problems of Philosophy (3 Credits)

PHIL828 Seminar in the History of Philosophy (3 Credits)

PHIL838 Seminar in Aesthetics (3 Credits)

PHIL848 Seminar in Ethics (3 Credits)

PHIL858 Seminar in Logic and Philosophy of Sciences (3 Credits)

PHIL859 Proseminar in the Philosophy of Science (3 Credits)
Seminar on the core areas of research in philosophy of science, with the focus on a theme currently generating attention in the field.
Restriction: Permission of instructor.
Repeatable to: 9 credits if content differs.

PHIL868 Seminar in Metaphysics (3 Credits)

PHIL869 Seminar in the Theory of Knowledge (3 Credits)

PHIL878 Seminar in Cognitive Studies (3-9 Credits)
Methodology and research in various disciplines involved in cognitive studies.
Restriction: Permission of ARHU-Philosophy department.
Repeatable to: 9 credits if content differs.

PHIL879 Seminar in Philosophy and Cognitive Studies (3 Credits)

PHIL888 Professional Mentoring for Doctoral Students (1-3 Credits)
Work with a faculty advisor on various aspects of professional development.
Restriction: Permission of ARHU-Philosophy department.
Repeatable to: 3 credits if content differs.

PHIL889 Pedagogical Mentoring for Doctoral Students (1-3 Credits)
Work with a faculty advisor to develop and improve pedagogical skills.
Restriction: Permission of ARHU-Philosophy department.
Repeatable to: 3 credits if content differs.

PHIL898 Pre-Candidacy Research (1-8 Credits)

PHIL899 Doctoral Dissertation Research (1-8 Credits)

PHSC - Public Health Science

PHSC401 History of Public Health (3 Credits)
Emphasis is on the history of public health in the Western world from antiquity to the present. Also examines the influence of public health developments as they relate to the Western world as well as throughout diverse cultures and societies across the globe. Analysis focuses on the interaction among Western and non-Western cultures with respect to health issues, including science, policies, prevention and treatment.
Restriction: Must be in Public Health Science program; and must have earned a minimum of 45 credits.
Credit Only Granted for: PHSC401 or SPHL401.
Formerly: SPHL401.

PHSC402 Public Health Emergency Preparedness (3 Credits)
Intensive introduction to public health emergency preparedness. Course will provide students with an overview of the role of public health in planning, prevention, preparedness, response, and recovery from disasters, both manmade and natural.
Restriction: Must be in Public Health Science program; and must have earned a minimum of 60 credits.
Credit Only Granted for: PHSC402 or SPHL402.
Formerly: SPHL402.

PHSC405 Policy Advocacy and Public Health (3 Credits)
Students will identify and analyze policy solutions to public health problems and determine advocacy strategies to encourage policy makers to implement the recommendations. Lectures, class discussions, group work and mock advocacy exercises will integrate the principles and practice of public health advocacy. Guest lecturers from a variety of settings will give students a broad range of perspectives and advocacy experiences.
Prerequisite: Minimum grade of C- in PHSC401.
Restriction: Must be in Public Health Science program; and must have earned a minimum of 60 credits.

PHSC410 Public Health Program Planning and Evaluation (3 Credits)
Students will become familiar with the dynamics of public health progra planning, and the basic process of identifying unmet needs. They will be able to identify different types of program evaluation, including needs assessment, formative research, process evaluation, impact assessment, and cost analysis.
Restriction: Must be in Public Health Science program; and junior standing or higher.
Credit Only Granted for: PHSC410 or SPHL410.
Formerly: SPHL410.

PHSC412 Food, Policy, and Public Health (3 Credits)
Broad overview of the impact of food and food policy on public health. Course covers topics such as access to food, food systems, influence of food policies on the individual, the cost of food, influences on food selection, food safety risks and responses, nutrition-related health challenges, and a comparison of US food/nutrition issues with those of other nations.
Prerequisite: Must have completed HLSA300 with a C- or higher.
Recommended: NFSC100.
Restriction: Must be in Public Health Science program; and junior standing or higher.
Credit Only Granted for: PHSC412 or SPHL412.
Formerly: SPHL412.

PHSC415 Essentials of Public Health Biology: The Cell, The Individual, and Disease (3 Credits)
Presents the basic scientific and biomedical concepts of modern public health problems and explores in depth mechanisms and models of the major categories of disease. The biologic principles presented are foundations to public health disease prevention, control, or management programs.
Prerequisite: Minimum grade of C- in BSCI202.
Recommended: BSCI223.
Restriction: Must be in Public Health Science program; and junior standing or higher.
Credit Only Granted for: PHSC415, SPHL415 or SPHL498J.
Formerly: SPHL415 and SPHL498J.

PHSC420 Vaccines and Immunology (3 Credits)
An exploration of immunology and vaccines through a public health lens. We will examine the cells, systems, and molecules that comprise the human immune system and defend your body against disease. In addition, we will discuss the strategies used during vaccine development including the history and future of vaccination and how increased understanding of the immune system has allowed scientists to improve and refine the process. Finally we will examine the current social and political situation surrounding vaccination and the roles and responsibility of public health practitioners.
Prerequisite: Minimum grade of C- in BSCI223.
Recommended: CHEM231.
Restriction: Must have earned a minimum of 60 credits. And must be in Public Health Science program; or permission of instructor.

PHSC425 Genetics, Genomics, and Public Health (3 Credits)
Recent advances in genomic science and biomedical technologies have increased our understanding of the genetic basis of disease and the interplay between genetics and environmental and behavioral factors. This course will provide a solid background in basic genetics and genomic science and highlight the role of public health professionals in translating breakthroughs in this rapidly transforming field into the clinical setting, program planning, and policy. Topics covered will include the molecular basis for genetic variation, fetal and newborn screening, genetic risk factors for cancer, pharmacogenetics, the role of pathogen genomics in outbreak investigation, and applications of genetic engineering in solving public health issues.
Prerequisite: Must have completed BSCI170 and 171 with a C- or higher.
Recommended: BSCI222 and BSCI223.
Restriction: Must have earned a minimum of 60 credits; and must be in Public Health Science program.
Credit Only Granted for: SPHL498X OR PHSC425.
Formerly: SPHL498X.

PHSC430 Public Health in the City: Perspectives on Health in the Urban Environment (3 Credits)
Exposure to issues related to city habitation and the health of the public, including how the urban environment impacts the lives and health of city dwellers, including discussion of the social determinants of health. Students are encouraged to think about urban health and policy, and to question the current state of urban public health. Issues of race, class, and equality will be discussed throughout the course as they relate to each of these topics.
Prerequisite: Minimum grade of C- in BSCI202 and MIEH300.
Restriction: Must be in Public Health Science program; and junior standing or higher.
Credit Only Granted for: PHSC430 or SPHL498G.
Formerly: SPHL498G.

PHSC497 Public Health Science Capstone (3 Credits)
The capstone course is the culminating experience for Public Health Science students and must be taken only in the final semester of study. The Public Health Science capstone course is designed to challenge students to integrate the five core areas of public health in investigating, researching and addressing public health issues. Throughout the semester, students will be required to evaluate, analyze and synthesize scholarly works as they research and propose solutions to a variety of public health issues. By the conclusion of this research based course, students will understand how the various public health perspectives can combine in addressing and informing public health practices.
Prerequisite: Must have completed the professional writing requirement with a C- or higher; and minimum grade of C- in MIEH400.
Restriction: Must have earned a minimum of 100 credits; and must be in Public Health Science program; and must be in the final semester of undergraduate study.
Credit Only Granted for: SPHL498F or PHSC497.
Formerly: SPHL498F.

PHYS - Physics

PHYS401 Quantum Physics I (4 Credits)
Introduces some quantum phenomena leading to wave-particle duality. Schroedinger theory for bound states and scattering in one dimension. One-particle Schroedinger equation and the hydrogen atom.
Prerequisite: PHYS371 and PHYS373.
Formerly: PHYS421.

PHYS402 Quantum Physics II (4 Credits)
Quantum states as vectors; spin and spectroscopy, multiparticle systems, the periodic table, perturbation theory, band structure, etc.
Prerequisite: PHYS401.

PHYS404 Introduction to Statistical Thermodynamics (3 Credits)
Introduction to basic concepts in thermodynamics and statistical mechanics.
Prerequisite: PHYS371 or PHYS420.

PHYS405 Advanced Experiments (3 Credits)
Advanced laboratory techniques. Selected experiments from many fields of modern physics. Emphasis on self-study of the phenomena, data analysis, and presentation in report form.
Prerequisite: PHYS375.
Restriction: Must be in a major within CMNS-Physics department.

PHYS407 Undergraduate Experimental Research (3 Credits)
Students develop and complete an independent, experimental research project with a professor in the Physics Department. The project should be a continuation of work done in PHYS499A. To obtain permission, students must submit a proposal describing the experimental work to be completed and this proposal must be approved by their faculty mentor, the associate chair for undergraduate education and the chair of the laboratory committee. Students must maintain a lab notebook, give an oral presentation and complete a written report on their research that includes data and error analysis.
Prerequisite: PHYS499 and PHYS375; and permission of CMNS-Physics department.
Restriction: Must be in a major within CMNS-Physics department; and senior standing.

PHYS410 Classical Mechanics (4 Credits)
Theoretical foundations of mechanics with extensive application of the methods. Various mathematical tools of theoretical physics.
Prerequisite: PHYS373.

PHYS411 Intermediate Electricity and Magnetism (4 Credits)
Foundations of electromagnetic theory, with extensive applications of the methods. Thorough treatment of wave properties of solutions of Maxwell's equations.
Prerequisite: PHYS373.

PHYS420 Principles of Modern Physics (3 Credits)
A survey of atomic and nuclear phenomena and the main trends in modern physics. Appropriate for students in engineering and other physical sciences.
Prerequisite: MATH246. And PHYS271 and PHYS270; or PHYS273.
Credit Only Granted for: PHYS371 or PHYS420.

PHYS428 Physics Capstone Research (2-4 Credits)
Individual, focused research under the guidance of a faculty member. Discussion, presentations and, if appropriate, research group projects involved. Student must submit final research paper for completion of course. Paper may also serve as thesis required for High Honors in Physics. Not intended as a general "reading course" (see PHYS499).
Restriction: Must be in a major within CMNS-Physics department; and senior standing or higher; and permission of instructor.
Repeatable to: 4 credits.

PHYS429 Atomic and Nuclear Physics Laboratory (3 Credits)
Classical experiments in atomic physics and more sophisticated experiments in current techniques in nuclear physics.
Prerequisite: PHYS405.

PHYS431 Properties of Matter (3 Credits)
Introduction to solid state physics. Electromagnetic, thermal, and elastic properties of metals, semiconductors, insulators and superconductors.
Prerequisite: PHYS271, PHYS270, and MATH241; and (PHYS401 or PHYS420). Also offered as: ENMA460.
Credit Only Granted for: ENMA460 or PHYS431.

PHYS441 Topics in Nuclear and Particle Physics (3 Credits)
A survey of concepts in particle and nuclear physics, with a topical emphasis on the impact of the Weak Interaction and the discovery of Parity Violation.
Prerequisite: PHYS401 or PHYS402.
Corequisite: PHYS402.

PHYS485 Electronic Circuits (4 Credits)
Theory and application to experimental physics of modern semiconductor analog and digital circuits. Emphasis on understanding passive and active elements in practical circuits. Topics span the range from simple transistor circuits to microcomputers.
Prerequisite: PHYS405.
Corequisite: PHYS374.
Restriction: Must be in a major within CMNS-Physics department.

PHYS499 Special Problems in Physics (1-16 Credits)
Research or special study. Credit according to work done.

PHYS601 Theoretical Dynamics (3 Credits)
Lagrangian and Hamiltonian mechanics, two-body central force problem, rigid body motion, small oscillations, continuous systems.
Prerequisite: PHYS410; or students who have taken courses with comparable content may contact the department.

PHYS603 Methods of Statistical Physics (3 Credits)
Foundations and applications of thermodynamics and statistical mechanics.
Credit Only Granted for: PHYS602 or PHYS603.

PHYS604 Methods of Mathematical Physics (3 Credits)
Ordinary and partial differential equations of physics, boundary value problems, Fourier series, Green's functions, complex variables and contour integration.
Prerequisite: Must have completed coursework in advanced calculus; and (PHYS411 and PHYS410). Or students who have taken courses with comparable content may contact the department.

PHYS606 Electrodynamics (4 Credits)
Classical electromagnetic theory, electro- and magnetostatics, Maxwell equations, waves and radiation, special relativity.
Prerequisite: PHYS604; or students who have taken courses with comparable content may contact the department.

PHYS615 Nonlinear Dynamics of Extended Systems (3 Credits)
Theory and applications of nonlinear dynamics of extended systems including nonlinear waves, pattern formation, turbulence, self-organized criticality and networks. Additional topics to be selected by instructor from areas of current research.
Prerequisite: PHYS601.

PHYS621 Graduate Laboratory (3 Credits)
Design and performance of advanced experiments in modern and classical physics.
Prerequisite: PHYS405; or students who have taken courses with comparable content may contact the department.

PHYS622 Introduction to Quantum Mechanics I (4 Credits)
First and second semesters. A study of the Schroedinger equation, matrix formulations of quantum mechanics, approximation methods, scattering theory, etc. Applications to solid state, atomic, and nuclear physics.
Prerequisite: Must have an outstanding undergraduate background in physics.

PHYS623 Introduction to Quantum Mechanics II (3 Credits)
First and second semesters. A study of the Schroedinger equation, matrix formulations of quantum mechanics, approximation methods, scattering theory etc., and applications to solid state, atomic, and nuclear physics. Continuation of PHYS 622.
Prerequisite: Must have an outstanding undergraduate background in physics.

PHYS624 Advanced Quantum Mechanics (3 Credits)
Relativistic wave equations, second quantization in many body problems and relativistic wave equations, Feynman-Dyson perturbation theory, applications to many body problems, application to quantum electrodynamics, elements of renormalization.
Prerequisite: PHYS623.

PHYS625 Non-relativistic Quantum Mechanics (3 Credits)
Non-relativistic second quantization, single particle Green's function, perturbation theory, linked cluster expansion, Feynman and Goldstone diagrams; applications to imperfect Fermi gases; superconductivity.
Prerequisite: PHYS623.

PHYS675 Introduction to Relativity, Gravitation and Cosmology (3 Credits)
Review of special relativity, followed by a study of the equivalence principle, curved spacetimes, and Einstein's equations. Selected applications to the solar system, stellar structure, black holes, gravitational waves, and cosmology.
Prerequisite: PHYS606 and PHYS601.

PHYS685 Research Electronics (4 Credits)
An integrated lecture and laboratory course in electronics with equal emphasis on experimental methods and results and analysis using device models and up-to-date mathematical and numerical tools. Experiments and analysis of circuits with passive and single active devices form the background for the study of operational amplifiers, digital integrated circuits and systems, and microcomputers. The general topics of impedance matching, frequency response, feedback, interfacing and the extraction of signal from noise are stressed.
Prerequisite: PHYS374 or PHYS405; or students who have taken courses with comparable content may contact the department.
Restriction: Must not have completed PHYS485.
Credit Only Granted for: PHYS485 or PHYS685.

PHYS704 Statistical Mechanics (3 Credits)
A study of the determination of behavior of matter from microscopic models. Microcanonical, canonical, and grand canonical models. Applications of solid state physics and the study of gases.
Prerequisite: PHYS411.

PHYS708 Seminar in Teaching College Physics (1 Credit)

PHYS709 Seminar in General Physics (1 Credit)

PHYS711 Symmetry Problems in Physics (3 Credits)
A study of general methods of classification of physical systems by their symmetries and invariance properties, especially in quantum field theory applications.
Prerequisite: PHYS623.

PHYS715 Chaotic Dynamics (3 Credits)
Theory and applications of chaos in dynamical systems including such topics as strange attractors, Lyapanov exponents, quasiperiodicity, period doubling, intermittency, crises, fractal basin boundaries, chaotic scattering, KAM tori, and quantum chaos.
Prerequisite: PHYS601.

PHYS718 Seminar in General Physics (1 Credit)

PHYS719 Seminar in General Physics (1 Credit)

PHYS721 Atomic and Optical Physics I (Survey) (3 Credits)
A survey of topics involving the physics of atoms and their interaction with radiation, including atoms in external fields, lasers, atomic spectroscopy and atomic structure.
Prerequisite: PHYS623.

PHYS728 Seminar in Atomic and Molecular Physics (1 Credit)

PHYS731 Solid State Physics: Survey (3 Credits)
A variety of topics such as crystal structure, mechanical, thermal, electrical, and magnetic properties of solids, band structure, the Fermi surface, and superconductivity will be treated. Although the emphasis will be on the phenomena, the methods of quantum mechanics are freely employed in this description.

PHYS732 Introduction to Solid State Physics II (3 Credits)
Second semester of survey course in condensed matter physics including topics in semiconductors, surface physics, magnetism and superconductivity.
Prerequisite: PHYS731.

PHYS738 Seminar in Experimental Solid State Physics (1 Credit)

PHYS739 Seminar in Theoretical Solid State Physics (1 Credit)

PHYS741 Nuclear Physics: Survey (3 Credits)
An introductory survey of nuclear physics, including the following topics: properties of the two-nucleon force and the most popular phenomenological potentials; properties of nuclei including radii, shapes and charge distributions; introduction to nuclear structure models, including collective, independent particle, and shell model; basic features of radioactivity including weak interactions and alpha decay; introduction to nuclear reactions, including phenomenological optical potentials and distorted wave approximations.
Prerequisite: PHYS623 and PHYS622.

PHYS748 Seminar in Experimental Nuclear Physics (1 Credit)

PHYS749 Seminar in Theoretical Nuclear Physics (1 Credit)

PHYS751 Elementary Particle Physics I: Survey (3 Credits)
Nuclear forces are studied by examining interactions at high energies. Meson physics, scattering processes, and detailed analysis of high energy experiments.
Corequisite: PHYS624.

PHYS752 Elementary Particle Physics II: Theory (3 Credits)
Survey of elementary particles and their properties, quantum field theory, meson theory, weak interactions, possible extensions of elementary particle theory.
Prerequisite: PHYS751 and PHYS624.

PHYS758 Seminar in Elementary Particles and Quantum Field Theory (1 Credit)

PHYS759 Seminar in Elementary Particles and Quantum Field Theory (1 Credit)

PHYS761 Plasma Physics I: Survey (3 Credits)
A detailed study of plasma physics. The first semester treats particle orbit theory, magnetohydrodynamics, plasma waves, and transport phenomena.
Prerequisite: PHYS606 and PHYS604.

PHYS762 Plasma Physics II (3 Credits)
Continuation of PHYS 761. Vlasov theory, including waves, stability, and weak turbulence, kinetic equation theories of correlations and radiative processes.
Prerequisite: PHYS761.

PHYS769 Seminar in Plasma Physics (1 Credit)

PHYS778 Seminar in Space and Cosmic Ray Physics (1 Credit)

PHYS779 Seminar in General Relativity (1 Credit)

PHYS798 Special Problems in Advanced Physics (1-3 Credits)
Projects or special study in advanced physics.

PHYS799 Master's Thesis Research (1-6 Credits)

PHYS808 Special Topics in General Physics (1-4 Credits)
Credit according to work done.

PHYS809 Special Topics in General Physics (1-4 Credits)
Credit according to work done.

PHYS818 Special Topics in General Physics (1-4 Credits)
Credit according to work done.

PHYS819 Special Topics in General Physics (1-4 Credits)
Credit according to work done.

PHYS828 Special Topics in Atomic and Molecular Physics (1-4 Credits)
Credit according to work done.

PHYS829 Special Topics in Quantum Mechanics and Quantum Electronics (1-4 Credits)
Credit according to work done.

PHYS832 Theory of Solids I (3 Credits)
Advanced topics in the quantum theory of solids from such fields as band structure calculations, optical properties, phonons, neutron scattering, the dynamics of electrons in one-band theory, the Landau Fermi Liquid Theory, charged Fermi liquids, the Fermi surface (surface impedance, cyclotron resonance, the DeHaas-Van Alphen Effect, etc.).
Prerequisite: PHYS623.
Corequisite: PHYS625.

PHYS838 Special Topics in Experimental Solid State Physics (1-4 Credits)
Credit according to work done.

PHYS839 Special Topics in Theoretical Solid State Physics (1-4 Credits)
Credit according to work done.

PHYS849 Special Topics in Theoretical Nuclear Physics (1-4 Credits)
Credit according to work done.

PHYS851 Advanced Quantum Field Theory (3 Credits)
Renormalization, unitarity, gauge theory, S-matrix construction.
Prerequisite: PHYS624.

PHYS858 Special Topics in Elementary Particles and Quantum Field Theory (1-4 Credits)
First semester.
Prerequisite: PHYS752 and PHYS851.

PHYS859 Special Topics in Elementary Particles and Quantum Field Theory (1-4 Credits)
Credit according to work done.

PHYS869 Special Topics in Plasma Physics (1-4 Credits)
Credit according to work done.

PHYS878 Special Topics in Space and Cosmic Ray Physics (1-4 Credits)
Credit according to work done.

PHYS879 Special Topics in General Relativity (1-4 Credits)
Credit according to work done.

PHYS888 Special Topics in Applied Physics (2 Credits)

PHYS889 Special Topics in Interdisciplinary Problems (1-4 Credits)
Credit according to work done.
Restriction: Permission of instructor.

PHYS898 Pre-Candidacy Research (1-8 Credits)

PHYS899 Doctoral Dissertation Research (1-8 Credits)

PLCY - Public Policy

PLCY610 Quantitative Aspects of Public Policy (3 Credits)
Introduces statistical methods needed for evaluating and choosing among policy options. Topics include probability; decision-making under uncertainty; the organization, interpretation, and visual display of complex data; prediction and inferences about causality; hypothesis testing; and linear and multiple regression. Develops analytical skills and the ability to apply theory to complex, real-world problems.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY610 or PUAF610.
Formerly: PUAF610.

PLCY611 Quantitative Analysis of Policy Issues (3 Credits)
Study of a series of problems and the development of quantitative techniques to describe or evaluate the problem. The organization and interpretation of complex data and its use for prediction and inference about casual effects. The definition of objectives, trade-offs among objectives, and allocation of resources to meet objectives. Sensitivity of outcomes to changing conditions.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY611 or PUAF611.
Formerly: PUAF611.

PLCY620 Political Analysis (3 Credits)
Examination of politics as a process for allocating scarce resources among claimants for public benefits. Comparision of the allocative model of politics with other distributive processes, such as markets. Comparison of the model with behavior of different political institutions, such as Congress and the presidency. Study of politics as a process with distinctive concepts of rationality. The translation of voter and interest group preferences into public choices. The impact of political decisions on competing constituencies.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY620 or PUAF620.
Formerly: PUAF620.

PLCY640 Microeconomic and Policy Analysis (3 Credits)
Applies intermediate microeconomic theory to public policy issues: resource allocation by firms and consumers; the response of economic agents to changes in incentives; market allocations in competitive and non-competitive environments; and market failures and government remedies. Uses extended case studies of particular issues in such areas as the environment (acid rain), international trade (tariffs), industry regulation (cable TV), and the provision of public goods (highways).
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY640 or PUAF640.
Formerly: PUAF640.

PLCY641 Macroeconomics and Policy Analysis (3 Credits)
Studies the behavior of the economy as a whole: the level of national income, unemployment, and inflation; the vulnerability of the U.S. economy to external influences; possible federal influence over the level of economic activity; and the consequences for prices, employment and the U.S. trade deficit. Also examines possible U.S. policy responses to widespread debt crises in developing countries.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY641 or PUAF641.
Formerly: PUAF641.

PLCY650 Moral Dimensions of Public Policy (3 Credits)
Explores the moral issues involved in public policy questions; the limits and usefulness of decision-making tools; problems of choosing, justifying and using criteria to judge a program's success and suitability; ethichal issues involving the welfare state and income distribution; and possible obligations beyond one's political community and generation.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY650 or PUAF650.
Formerly: PUAF650.

PLCY660 Environmental Policy Workshop (3 Credits)
Students work as a team to analyze and recommend responses to a current enviornmental policy issue. Emphasizes problem definition, organization of information and presentation of results.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY660 or PUAF660.
Formerly: PUAF660.

PLCY670 Public Budgeting & Financial Management (3 Credits)
Covers how governments raise, spend, borrow, and manage public funds. Reviews federal,state, and local budget processes and introduces analytical techniques including basic spreadsheet skills, evaluating alternative revenue sources, revenue and expenditure forecasting, cost allocation, capital budgeting, cost-benefit analysis, discounting and present value, bond analysis, cash management and intergovernmental finance.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLYC670 or PUAF670.
Formerly: PUAF670.

PLCY671 Public Sector Finance (3 Credits)
The goal of this course is to provide a useful overview of basic public sector financial management principles in a simulated managerial situation to midcareer students currently working in government and nonprofit organizations.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY671 or PUAF671.
Formerly: PUAF671.

PLCY688 Topics in Public Policy (1-3 Credits)
Special topics in Public Policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of instructor.
Repeatable to: 18 credits if content differs.
Credit Only Granted for: PLCY688 or PUAF688.
Formerly: PUAF688.

PLCY689 Public Policy Topics (1-3 Credits)
Special Topics in Public Policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of instructor.
Repeatable to: 18 credits if content differs.
Credit Only Granted for: PLCY689 or PUAF689.
Formerly: PUAF689.

PLCY692 Leadership Principles and Practices (3 Credits)
This course will introduce leadership principles and practices to students by focussing on the theory of leadership, different leadership themes and skills, and discussions with practitioners.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY692 or PUAF692.
Formerly: PUAF692.

PLCY698 Selected Topics in Public Affairs (1-3 Credits)
Special topics that arise in public policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.

PLCY699 Selected Topics Public Policy (1-3 Credits)
Special topics that arise in public policy.
Restriction: Must be in a major in PLCY-School of Public Policy; and permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY699 or PUAF699.
Formerly: PUAF699.

PLCY700 U.S. Trade: Policy and Politics (3 Credits)
Interplay between government and private interests in shaping official actions that affect international trade. Policy tools available to influence balance, magnitude, and composition of imports and exports. Evolution of executive, congressional and quasi-judicial government institutions under increased U.S. international trade exposure and trade deficit.
Prerequisite: PUAF641, PUAF620, and PUAF640.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY700 or PUAF700.
Formerly: PUAF700.

PLCY706 Public Policymaking for Journalists (3 Credits)
Focuses on the political, procedural and administrative realities of policy formation and implementation. Specifically for the Journalism students who staff the Capital News Service.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: PLCY706 or PUAF706.
Formerly: PUAF706.

PLCY711 Public Management and Leadership (3 Credits)
Reviews the managerial, political, and ethical problems faced by public sector managers and leaders, including setting an organization's goals, obtaining and protecting a program mandate, designing a service delivery system and implementing a new program.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY711 or PUAF711.
Formerly: PUAF711.

PLCY712 Analysis of Fiscal Conditions (3 Credits)
The financial operations of U.S. government at various levels, with emphasis on local governments. Practical problems in revenue management, including revenue forecasting and cash flow analysis; debt management operations, such as borrowing; intergovernmental financial operations, such as grants management and reporting requirements, and personnel management issues that have a direct bearing on governmental finances.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY712 or PUAF712.
Formerly: PUAF712.

PLCY715 Government and Non-Profit Accounting (3 Credits)
Basic accounting practices of governmental and non-profit organizations. Emphasis on presentation of data in assessing an organization's financial health, financial data by organizations, structuring of accounting information to achieve management control, way in which evolving national standards influence kinds of information organizations have to apply in the future.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY715 or PUAF715.
Formerly: PUAF715.

PLCY716 State and Local Government Budgeting (3 Credits)
State and local government practices as a laboratory for studying public sector financial management.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY716 or PUAF716.
Formerly: PUAF716.

PLCY717 Federal Budgeting: Policy and Process (3 Credits)
Budgeting as a political and administrative instrument of government. Development of budgeting, the multiple uses of the budget, including role in fiscal policy and resource allocation, the roles and relationships of major participants, and effects of resource scarcity on budgeting behavior. Emphasis on the federal level.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY717 or PUAF717.
Formerly: PUAF717.

PLCY720 International Security Policy (3 Credits)
Reviews the principal features of international security as currently practiced. Traces the evolution of contemporary policy beginning with the initiation of nuclear weapons programs during World War II. Particular emphasis is given to experience of the United States and Russia, since the historical interaction between these two countries has disproportionately affected the international security conditions that all other countries now experience.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY720 or PUAF720.
Formerly: PUAF720.

PLCY722 Terrorism and Democracy (3 Credits)
United States government's decision process for dealing with crises; the options available to a president for deterring and handling incidents of terrorism, and how a president can and should select between the options.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY722 or PUAF722.
Formerly: PUAF722.

PLCY724 Problems of Global Security (3 Credits)
Explores the international security implications of globalization, presenting evidence indicating that altered circumstances will eventually induce a major redesign of prevailing security arrangements. Includes three segments: 1) a review of the principal problems that have been the focus of established security policy and would be the context for any major adjustment of policy; 2) an assessment of relationships with the major countries where traditional problems are most acutely present; and 3) a review of the organizing principles that can be expected to emerge in the new situation.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY724 or PUAF724.
Formerly: PUAF698W and PUAF724.

PLCY732 Policy and Politics of Education Reform (3 Credits)
Examines education reform in its historical, fiscal, cultural, and lega contexts, and the changing relationship between education and economic opportunity. Focuses on institutional and normative issues, including national standards, public school choice, charter schools, vouchers and funding equity.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY732 or PUAF732.
Formerly: PUAF732.

PLCY734 Foundations of Social Policy (3 Credits)
Provides an overview of government's role in social policy and the history of the development of federal and state policies with respect to welfare, aging, education, and housing. Analyzes current federal institutions and legislation in the same policy areas and the demographic history of the United States. Develops skills in analytic writing and presentation of descriptive data.
Restriction: Must be in a major in PLCY-School of Public Policy.
Credit Only Granted for: PLCY734 or PUAF734.
Formerly: PUAF734.

PLCY735 Health Policy (3 Credits)
Analyzes the origins, history, status, and future of health care as problems in political and economic theory and as puzzles in policy formation. Considers current American reform controversies in the light of several disciplines and in comparison to foreign experiences and structures.
Credit Only Granted for: PLCY735 or PUAF735.
Formerly: PUAF735.

PLCY736 Managing Social Services (3 Credits)
Focuses on managing social services across federal, state, and local jurisdictions with an emphasis on how strong management can improve results. Exposes students to management thought and philosophy as applied to different social services and social policy challanges within various operating environments and programmatic settings. The watchwords for this course are "management" and "applied".
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PUAF736, PLCY736 or PUAF698V.
Formerly: PUAF698V and PUAF736.

PLCY737 Strategies of Equality (3 Credits)
Concentrates on the institutional and political means by which disadvantaged segments of the United States population have sought to enhance their social, economic and political prospects. Race, gender and disability are the substantive focal points, with considerable attention given to the challanges of African American socio-political uplift. Also explores legislation, litigation, administration, agitation (i.e. protest), and constitutional reform. Students become familiar with alternative conceptions of equality and the modes of argument employed in different institutional and political contexts.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY737 or PUAF737.
Formerly: PUAF698Y and PUAF737.

PLCY740 Public Policy and the Environment (3 Credits)
Surveys of major federal environmental legislation; the development and implementation of laws, and alternative ways of thinking about the relationship between humans and the environment.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY740 or PUAF740.
Formerly: PUAF740.

PLCY741 Global Environmental Problems (3 Credits)
Suitability of analytic tools for examining global environmental problems, human overpopulation, land abuse, ozone depletion, climate change, acid rain, loss of biological diversity, the scarcity of food, fresh water, energy and nonfuel mineral resources, and health hazards of pollutants toxic metals and radiation.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY741 or PUAF741.
Formerly: PUAF741.

PLCY742 Environmental Ethics (3 Credits)
Analyzes issues such as the relation between human beings and nature from the perspectives of the science, history, philosophy, and religion. Considers the bases for policies such as environmental regulation, public lands, and international conventions with respect to the environment.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLYC742 or PUAF742.
Formerly: PUAF742.

PLCY743 Ecological Economics (3 Credits)
Explores how taking account of the economic system's fundamental dependence on the environment alters conventional economic goals, priorities, theories, and prescriptions.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY743 or PUAF743.
Formerly: PUAF743.

PLCY744 Environment and Development (3 Credits)
Analyzes sustainable development and its conflicting interpretations. The dominant view, as expressed in the World Bank's 1992 World Development Report, is studied, along with some critical responses. Further readings on issues of population, consumption and development indicators.
Credit Only Granted for: PLCY744 or PUAF744.
Formerly: PUAF744.

PLCY745 Human Health and Environmental Policy (3 Credits)
Reviews the major human physiological systems and their integrated toxicological functions; considers key bodily defenses; and discusses classic, emerging, and ambiguous risks; in all ecological context. Applies to scientific controversy, the methods of policy formation, such as risk analysis, social-cost analysis, "outcomes" analysis, and decision analysis, all in political-economic context.
Credit Only Granted for: PLCY745 or PUAF745.
Formerly: PUAF745.

PLCY746 Dynamic Modeling for Environmental Investment and Policy Making (3 Credits)
Examines the theory, methods and tools to dynamic modeling for policy and investment decision making, with special focus on environmental issues. Provides extensive hands-on modeling experience and makes use of state-of-art computing methods to translate theory and concepts into executable models.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY746 or PUAF746.
Formerly: PUAF698M and PUAF746.

PLCY752 Managing Differences:Resolving Conflict and Negotiating Agreements (3 Credits)
Enhances the student's negotiation and leadership skills for managing differences between individuals and groups. Students study the nature of conflict, learn how to handle two and multiparty conflicts, exerting leadership where there are no hierarchy leaders, and explore the impact of facilitators and mediators on the negotiating process. Blends skill building exercises and theory discussions about the behavior of groups and individuals in groups to understand negotiation dynamics.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY752 or PUAF752.
Formerly: PUAF752.

PLCY753 Advanced Negotiations (3 Credits)
Deepens the student's negotiation and leadership skills for managing differences between individuals and groups. Cover conflict, escalation, dealing with intractable conflicts, sustaining agreements in inter-group conflicts, and the effects of trauma on negotiations.
Prerequisite: PUAF752.
Credit Only Granted for: PUAF698C, PUAF753 or PLCY753.
Formerly: PUAF698C and PUAF753.

PLCY770 Seminar in Housing and Community Development Strategies (3 Credits)
Detailed examination of community and social policy issues relating to the construction and management of affordable housing.
Restriction: Must be in a major in PLCY-School of Public Policy.
Credit Only Granted for: PLCY770 or PUAF770.
Formerly: PUAF770.

PLCY771 Housing and Community Development Overview (3 Credits)
An overview of the housing development process. Community development context, financial analysis, analytical tools including microcomputer applications, architectural and design issues, engineering constraints.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.
Credit Only Granted for: PLCY771 or PUAF771.
Formerly: PUAF771.

PLCY772 Housing Finance (3 Credits)
Fundamentals of housing investment analysis. Structuring feasibility analyses, appraisals, pro forma statements, return on investment, leverage analysis, underwriting ratios, taxation and syndication.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.
Credit Only Granted for: PLCY772 or PUAF772.
Formerly: PUAF772.

PLCY773 Housing Clinic (3 Credits)
Issues and strategies applicable to urban, suburban, and rural areas. Field experience and a team exercise, using the case study method, will give an opportunity for concrete application of the concepts to a specific set of community problems.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.
Credit Only Granted for: PLCY773 or PUAF773.
Formerly: PUAF773.

PLCY774 Asset Management (3 Credits)
Asset manager's role at each stage of the property's life cycle and property analysis, including cash flow debt and staffing. Topics include capital needs; major building systems, costs and useful lives; marketing and outreach; and anti-crime strategies. Field trips to problem properties to perform cost/benefit analysis, diagnose potential cures, and prepare action plans.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.
Credit Only Granted for: PLCY774 or PUAF774.
Formerly: PUAF774.

PLCY780 The American Foreign Policy-Making Process (3 Credits)
Survey and analysis of the governmental institutions and processes which shape U.S. global engagement on national security and international economic issues. Particular emphasis is given to executive-congressional relations and the broader domestic roots of foreign policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY780 or PUAF780.
Formerly: PUAF780.

PLCY781 International Economic Policy (3 Credits)
Issues and choices facing the United States in today's global economy. Primary, but not exclusive, emphasis is given to "competitive interdependence" among advanced industrial societies.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY781 or PUAF781.
Formerly: PUAF781.

PLCY782 International Development Economics (3 Credits)
Examines key current economic and policy issues for developing and transition economies. Topics include inflation stabilization, fiscal policy, selected trade issues, dealing with international capital flows, the role of multilateral organizations, such as the International Monetary Fund and the World Bank, and issues relating to saving, investment and growth.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PUAF698U, PUAF782 or PLCY782.
Formerly: PUAF698U and PUAF782.

PLCY783 Development and Foreign Aid (3 Credits)
Examines the empirical, conceptual, and ethical dimensions of international development policies and U.S. foreign aid. What is the present character of development in poor countries/regions? How should development be conceived? What development strategies are best? What is and should be the purpose of U.S. foreign aide and development assistance?
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY783 or PUAF783.
Formerly: PUAF698Q and PUAF783.

PLCY784 Disease, Disaster, and Development (3 Credits)
Studies development, the process by which needy people in fragile societies become self-sufficient people in resilient societies, in relation to disease and disaster, with particular attention to the developed world's response.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PUAF699D, PUAF784 or PLCY784.
Formerly: PUAF699D and PUAF784.

PLCY790 Project Course (3 Credits)
Students work at a sponsoring government agency or private firm researching problem of interest to sponsor and relevant to concentration. Emphasis on problem definition, organizing information, and both oral and written presentation of results.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY790 or PUAF790.
Formerly: PUAF790.

PLCY798 Readings in Public Policy (1-3 Credits)
Guided readings for discussions on public policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY798 or PUAF798.
Formerly: PUAF798.

PLCY898 Pre-Candidacy Research (1-8 Credits)

PLCY899 Doctoral Dissertation Research (1-8 Credits)

PLSC - Plant Sciences

PLSC400 Plant Physiology (4 Credits)
A survey of plant physiology and development responses and adaptation to the environment.
Prerequisite: BSCI170 and BSCI171; or BSCI105; or PLSC201. And CHEM231 and CHEM232; or CHEM237; or permission of AGNR-Plant Science & Landscape Architecture department. Also offered as: BSCI442.
Credit Only Granted for: BSCI442 or PLSC400.

PLSC401 Pest Management Strategies for Turfgrass (3 Credits)
Interdisciplinary view of weed, disease, and insect management from an agronomy perspective. Plant responses to pest invasion, diagnosis of pest-related disorders, and principles of weed, disease and insect suppression through cultural, biological and chemical means are discussed.
Prerequisite: PLSC305.

PLSC402 Sports Turf Management (3 Credits)
Sports turf management, including design, construction, soil modification, soil cultural techniques, pesticide use, fertilization, and specialized equipment.
Prerequisite: PLSC305 and PLSC401.

PLSC404 Plant and fungal Metabolism (3 Credits)
An introduction to biochemistry and metabolism in plants and fungi, covering the biosynthesis of compartments in plant and fungal cells with biological molecules such as nucleic acids, amino acids and lipids. Energy flow processes such as photosynthesis, carbohydrate metabolism and respiration, are covered in the course. The integration of different pathways in plant development and responses to environmental stresses will be discussed.
Prerequisite: BSCI170 and BSCI171; or PLSC201. And CHEM231 and CHEM232; or CHEM237; or permission of AGNR-Plant Science & Landscape Architecture department.

PLSC405 Agroecology (3 Credits)
How can we balance the multiple, and often competing objectives of sustainable agricultural intensification to promote both agricultural productivity and human wellbeing? The answer to this question requires a transdisciplinary, agroecological perspective. Agroecology is the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions. This course is designed to introduce various topics in agroecology (e.g. organic agriculture, biodiversity, the Farm Bill). We will take an ecosystems approach to the study of agriculture that will enable students to analyze the environmental, social, and economic interconnections within various types of agricultural systems locally and globally.
Prerequisite: At least one course in ecology; or permission of instructor.
Recommended: BSCI361 or PLSC471; or any BSCI or ENST ecology course.
Credit Only Granted for: PLSC405 or PLSC605.
Additional Information: Class will be held on campus, with two day-long field trips to local farms.

PLSC407 Advanced Crop Science (3 Credits)
A study of principles of production for forage crops, corn, small grains, rice, millets, sorghums, soybeans and other oil seed crops. Their seed production, processing, distribution and the current federal and state seed control programs for these agronomic crops will also be discussed.
Prerequisite: PLSC101. And BSCI170 and BSCI171; or BSCI105.

PLSC410 Commercial Turf Maintenance and Production (3 Credits)
Agronomic programs and practices used in hydroseeding, commercial lawn care, sod production and seed production. Current environmental, regulatory and business management issues confronting the turfgrass industry.
Prerequisite: PLSC305; or permission of AGNR-Plant Science & Landscape Architecture department.

PLSC415 Diseases of Trees and Shrubs (3 Credits)
Diseases on woody plants commonly planted or native to Mid-Atlantic region. Biology, identification and management of important plant pathogens.
Prerequisite: PLSC100 and PLSC201; or permission of instructor.
Credit Only Granted for: PLSC415 or PLSC489E.
Formerly: PLSC489E.

PLSC420 Principles of Plant Pathology (4 Credits)
An introduction to the causal agents, nature and management of plant diseases with particular attention paid to economically important diseases of horticultural and agronomic crops.
Prerequisite: CHEM131, CHEM132, and PLSC201; or students who have taken courses with comparable content may contact the department.

PLSC425 Green Roofs and Urban Sustainability (1 Credit)
The integration of disciplines associated with sustainability issues. Topics range from plant science to design to policy, all of which can contribute to improving the urban environment.
Credit Only Granted for: PLSC425 or PLSC489V.
Formerly: PLSC489V.

PLSC430 Water and Nutrient Planning for the Nursery and Greenhouse Industry (3 Credits)
Skills will be developed in order to write nutrient management plans for the greenhouse and nursery industry. Completion of this course can lead to professional certification in nutrient planning by the State of Maryland after MDA examinations are passed.
Prerequisite: CHEM131 and CHEM132; or ENST200; or permission of instructor.
Recommended: PLSC432.

PLSC432 Greenhouse Crop Production (3 Credits)
The commercial production and marketing of ornamental plant crops under greenhouse, plastic houses and out-of-door conditions.
Prerequisite: PLSC201 and PLSC202; and must have completed or be concurrently enrolled in BSCI442.

PLSC433 Technology of Fruit and Vegetable Production (4 Credits)
A critical analysis of research work and application of the principles of plant physiology, chemistry and botany to practical problems in the commercial production of fruit and vegetable crops.
Prerequisite: PLSC201, NRSC411, PLSC271, and PLSC202; or students who have taken courses with comparable content may contact the department.
Corequisite: BSCI442.
Recommended: ENST200.
Restriction: Junior standing or higher.
Credit Only Granted for: NRSC411 or PLSC433.

PLSC452 Environmental Horticulture (3 Credits)
Environmental horticulture principles used in the establishment and maintenance of plant materials in residential and commercial landscapes will be addressed. The effect of soil conditions, environmental factors, and commercial practices will be discussed in relation to the growth and development of newly-installed plant materials. Field diagnostics will be used by students to assess significant problems of plant decline. Environmental sustainability will be combined with current commercial practices of storm water management, nutrient management, and irrigation management to achieve an integrated approach to plant management.
Prerequisite: PLSC100 or PLSC101; and (PLSC253 and PLSC254).

PLSC453 Weed Science (3 Credits)
Weed identification, ecology, and control (cultural, mechanical, biological, and chemical methods).

PLSC460 Application of Knowledge in Plant Sciences (3 Credits)
A capstone course based on interactions with plant science professionals and student-led class discussions. Students will apply their knowledge and experience to practical issues in the discipline, further develop critical thinking ability, and enhance their communication, teamwork, and professional skills. Topics will include nutrient management, integrated pest management, plant interactions with urban and rural ecosystems, planning of public grounds, plant biotechnology, and teaching skills.
Prerequisite: PLSC100 or PLSC101; or permission of instructor.
Recommended: ENGL393 and ENST200; and (PLSC389 or PLSC399).
Restriction: Senior standing or higher. And must be in a major within AGNR-Plant Science & Landscape Architecture department; or must be in another related major.

PLSC461 Cultural Management of Nursery and Greenhouse Systems: Substrates (1 Credit)
One of three 1-credit modules (PLSC461, PLSC462 and PLSC 464)covering the management techniques used in the intensive culture of plants in commercial operations. Specifically, this module covers the composition, handling, physical and chemical properties of substrates and how they should be managed to maximize plant growth.
Credit Only Granted for: PLSC461 or PLSC489T.
Formerly: PLSC489T.
Additional Information: Course material is delivered primarily online, but a four hour face-to-face lecture/lab will be held at the end of the module. PLSC 461, 462 and 464 will be taught sequentially during the semester.

PLSC462 Cultural Management of Nursery and Greenhouse Systems; Irrigation (1 Credit)
One of three 1-credit modules (PLSC461, PLSC462 and PLSC464) covering the management techniques used in the intensive culture of plants in commercial operations. Specifically, this module covers water quantity and quality issues, water supply (basic hydraulics), irrigation system design and irrigation system evaluation (performance) to maximize water application efficiency.
Credit Only Granted for: PLSC462 or PLSC489W.
Formerly: PLSC489W.
Additional Information: Course material is delivered primarily online, but a four hour face-to-face lecture/lab will be held at the end of the module. PLSC 461, 462 and 464 will be taught sequentially during the semester.

PLSC464 Cultural Management of Nursery and Greenhouse Systems: Nutrients (1 Credit)
One of three 1-credit modules (PLSC461, PLSC462 and PLSC464) covering the management techniques used in the intensive culture of plants in commercial operations. Specifically, this module covers the basics of fertilization, different fertilization strategies and nutrient use and efficiency, to optimize nutrient application practices in intensive plant production systems.
Credit Only Granted for: PLSC464 or PLSC489Z.
Formerly: PLSC489Z.
Additional Information: Course material is delivered primarily online, but a four hour face-to-face lecture/lab will be held at the end of the module. PLSC 461, 462 and 464 will be taught sequentially during the semester.

PLSC471 Forest Ecology (3 Credits)
An understanding of the forest ecosystem, its structure and the processes that regulate it are provided. It also considers changes that occur in forests, the interaction of environment and genetics in promoting ecosystem sustainability, and the role of human influences on urban forest ecosystems.
Prerequisite: PLSC201; or (BSCI160 and BSCI161); or BSCI106.

PLSC472 Capstone-Urban Forest Project Management (3 Credits)
Students will synthesize the ideas and information learned from their studies in urban forestry. Working in teams, students will complete projects involving real-world issues. Student projects will use scientific, social, political and ethical considerations in an interdisciplinary approach to provide solutions to their problem.
Prerequisite: ENST200, PLSC272, and PLSC471.
Restriction: Senior standing or higher; and must be in a major within AGNR-Plant Science & Landscape Architecture department.

PLSC473 Woody Plant Physiology (3 Credits)
Concentration is placed on physiological processes important to woody plant growth and development. Emphasis will be placed on current concepts and theories of how woody plants grow and develop, and the critical assessment of current research in woody plant physiology. Course readings will include textbook assignments and selected papers from the current scientific literature.
Prerequisite: BSCI442 or PLSC201; or students who have taken courses with comparable content may contact the department.

PLSC475 Applied Forestry Practices (3 Credits)
Focuses on the applied dynamics of a set of forest practices such as management, silviculture, measurement and inventory, preparation of a management plan, etc, within the urban/rural interface. Several field trips are included to gain hands-on experience.
Prerequisite: ENST200. And ENST360; or PLSC471. Also offered as: ENST406.
Credit Only Granted for: ENST406 or PLSC475.

PLSC480 Urban Ecology (3 Credits)
Cities are rapidly increasing in number and size across the globe, transforming local ecosystems. This course examines urban environments as coupled social-ecological systems at multiple scales, from streets and parks to urban landscapes patterns and global patterns of biodiversity. Ecological principles are applied in the urban context, including habitats, biodiversity, ecological processes, and ecosystem services of urban environments, with applications to problems in urban land management, decision-making and design.
Prerequisite: PLSC471, ENST360, or BSCI363; or other coursework/ experience considered for instructor permission.
Additional Information: Class will be held both on campus and at other locations such as the U.S. Botanic Garden, local parks, and urban and suburban locations off campus.

PLSC481 Vegetation Assessment and Analysis (2 Credits)
An overview of vegetation assessment through the collection of data in the field (e.g. plots and transects) and the analysis of existing data and remotely detected images (e.g. Aerial photographs and GIS layers).
Prerequisite: PLSC100; or (BSCI160 and BSCI161); or BSCI106; or permission of instructor.
Recommended: PLSC201, BSCI360, PLSC226, or PLSC471.

PLSC489 Special Topics in Plant Science (1-3 Credits)
A lecture and or laboratory series organized to study a selected phase of Plant Science not covered by existing courses. Credit according to time scheduled and organization of the course.
Repeatable to: 6 credits if content differs.

PLSC601 Plant Genomics (3 Credits)
An advanced course in plant genomics which is the study of genes of plant chromosomes. It will cover current topics in gene mapping, molecular markers, QTLs, gene sequencing, and genetic engineering with special focus on agriculturally important traits.
Credit Only Granted for: AGRO601, NRSC601, or PLSC601.
Formerly: NRSC601.

PLSC602 Advanced Crop Breeding II (2 Credits)
Quantitative inheritance in plant breeding including genetic constitution of a population, continuous variation, estimation of genetic variances, heterosis and inbreeding, heritability, and population movement.
Prerequisite: PLSC601; and must have completed a graduate statistics course.

PLSC605 Advanced Agroecology (3 Credits)
How can we balance the multiple, and often competing objectives of sustainable agricultural intensification to promote both agricultural productivity and human wellbeing? The answer to this question requires a transdisciplinary, agroecological perspective. Agroecology is the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions. This course is designed to introduce various topics in agroecology (e.g. organic agriculture, biodiversity, the Farm Bill). We will take an ecosystems approach to the study of agriculture that will enable students to analyze the environmental, social, and economic interconnections within various types of agricultural systems locally and globally. Students will be required to plan and execute group discussions and learning activities.
Prerequisite: At least one course in ecology or instructor permission.
Recommended: BSCI361 or PLSC471; or any BSCI or ENST ecology course.
Additional Information: Class will be held on campus, with two day-long field trips to local farms.

PLSC608 Research Methods (2 Credits)
An overview of research methods and applications related to plant sciences. Topics covered include current research advances, professional conduct and ethics, and preparation of grant proposals, manuscripts, and scientific presentations.
Prerequisite: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: AGRO608, NRSC608, or PLSC608.
Formerly: NRSC608.

PLSC609 Integrated Pest Management (1-4 Credits)
A modular course with an interdisciplinary approach to the theory and practice of integrated pest management. Topics of modules, each 3-4 weeks long, vary each semester over a three year time frame, with the first module serving as a prerequisite for all other modules. See www.EntmClasses.umd.edu for description of modules.
Restriction: Permission of instructor.
Repeatable to: 10 credits if content differs. Also offered as: ENTM609.
Credit Only Granted for: ENTM609, NRSC609, or PLSC609.
Formerly: NRSC609.

PLSC618 Advances in Research; Critiquing Primary Plant Science Literature (1 Credit)
Discussion of advances in plant science research based on classic and current scientific literature.
Repeatable to: 7 credits.

PLSC619 Seminars in Plant Science and Landscape Architecture (1 Credit)
Enhancement of student learning and enrichment of student curriculum for the Plant Science Graduate Program through a combination of research seminar attendance and post-seminar discussion. Research seminars will be given by prominent scientists in the field of plant sciences and post-seminar discussions will be facilitated by the instructor along with student discussion leaders.
Repeatable to: 7 credits if content differs.

PLSC682 Methods of Plant Science Research (4 Credits)
The application of biochemical and biophysical methods to problems in biological research with emphasis on plant materials.
Credit Only Granted for: HORT682, NRSC682, or PLSC682.
Formerly: NRSC682.

PLSC685 Advanced Plant Ecophysiology (3 Credits)
Growth, productivity and survival are intimately linded to a plant's ability to adjust to its environment. The information provided in this course is designed to provide an introduction to the basic physical and psysiological principles necessary for understanding the interactions between plants and their environment. The overall objective of this course is to understand plant responses and adaptations to the environment and the ecological relevance of these responses.
Prerequisite: Must have completed one course in plant physiology.
Credit Only Granted for: NRSC685 or PLSC685.
Formerly: NRSC685.

PLSC689 Special Topics (1-3 Credits)
Credit according to time scheduled and organization of the course. Organized as a lecture series on a specialized advanced topic.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: HORT689, NRSC689, or PLSC689.
Formerly: NRSC689.

PLSC782 Physiology, Biochemical and Molecular Biology of Herbicides and Plant Growth Regulators (3 Credits)
In this class we will study natural and synthetic chemicals which regulate the growth and development of plants. The mechanism by which herbicides and plant growth regulators express their activity on plants and the impact of these chemicals on the environment will be a primary focus of this course. The interaction of these chemicals with biotechnology advances will also be examined.
Prerequisite: BSCI442.
Credit Only Granted for: NRSC782 or PLSC782.
Formerly: NRSC782.

PLSC785 Advanced Post-Harvest Physiology (3 Credits)
Physiological, biochemical and molecular aspects of senescence of detached plant organs, such as fruits, leaves and flowers.
Prerequisite: PLSC474 and BCHM461; or permission of AGNR-Plant Science & Landscape Architecture department.
Credit Only Granted for: NRSC785 or PLSC785.
Formerly: NRSC785.

PLSC789 Advances in Research (1 Credit)
Discussion of advances in plant science research based on classic and current scientific literature.
Repeatable to: 7 credits if content differs.
Credit Only Granted for: AGRO789, NRSC789, or PLSC789.
Formerly: NRSC789.

PLSC798 Graduate Seminar (1 Credit)
First and second semester.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: AGRO798, HORT798, NRSC798, or PLSC798.
Formerly: NRSC798.

PLSC799 Master's Thesis Research (1-6 Credits)

PLSC802 Epidemiology and Plant Disease Mangement (3 Credits)
An in-depth advanced course for graduate students in plant pathology, agronomy, entomology and horticulture emphasizing the principles of effective plant disease management in the agroecosystem.
Credit Only Granted for: AGRO802, NRSC802, or PLSC802.
Formerly: NRSC802.

PLSC805 Advanced Crop Physiology (2 Credits)
Major emphasis will be on physiological processes affecting yield and productivity of major food fiber and industrial crops of the world. Topics such as photosynthesis, respiration, photorespiration, nitrogen metabolism will be related to crop growth as affected by management decisions. Topics of discussion will also include growth analysis and the use of computer modeling of crop growth by plant scientists.
Prerequisite: BSCI442; and must have completed advanced training in plant sciences.
Credit Only Granted for: NRSC805 or PLSC805.
Formerly: NRSC805.

PLSC898 Pre-Candidacy Research (1-8 Credits)

PLSC899 Doctoral Dissertation Research (1-8 Credits)

PORT - Portuguese

PORT405 Portuguese for Spanish Speakers (3 Credits)
Intensive basic grammar, reading and auditory comprehension. Native or acquired fluency in Spanish required.
Restriction: Must have native or acquired fluency in Spanish.

PORT408 Special Topics in Portuguese Literature (3 Credits)
Major themes and literary developments from the late 18th century to the present.
Repeatable to: 6 credits if content differs.

PORT409 Special Topics in Brazilian Literature (3-6 Credits)
Major themes and literary development from the late eighteenth century to the present. Specific topic to be announced each time the course is offered.

PORT478 Themes and Movements of Luso-Brazilian Literature in Translation (3 Credits)
A study of specific themes and movements either in Portuguese or Brazilian literature, as announced. Designed for students for whom the literatures would be inaccessible in Portuguese.
Repeatable to: 6 credits if content differs.

PORT480 Machado de Assis (3 Credits)
Fiction of Machado de Assis covering his romantic and realistic periods.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

PORT609 Special Topics - Brazilian Literature (3-6 Credits)
Representative topics/authors/works of Brazilian literature. Texts in Portuguese: classes conducted in Portuguese and Spanish.
Prerequisite: Must have reading knowledge of Portuguese - fluency in Spanish or Portuguese.
Repeatable to: 6 credits if content differs.

PORT699 Independent Study of Portuguese (1-3 Credits)
This course is designed to provide graduate students an opportunity to pursue independent study under the supervision of a member of the department.
Repeatable to: 3 credits.

PSYC - Psychology

PSYC401 Biological Bases of Behavior Laboratory (4 Credits)
Students will study some of the key concepts in neuroscience by combining behavioral experiments with electrode recording from neurons controlling the behaviors. We will intensively examine concepts like creation of rhythmic behaviors (walking, flight), neurotransmitters control of aggression, drug affects on synaptic activity, high-speed neural circuits for effective escape from predators, and CNS maps in the visual system for directing prey capture. Students will learn microsurgery and a broad range of neural recording techniques. We work with animals (invertebrates, cold-blooded vertebrates) every week. A strong biology background will be beneficial.
Prerequisite: PSYC300; and (PSYC301 or BSCI353).
Restriction: Permission of instructor; and must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC402 Neural Systems and Behavior (3 Credits)
Research on the physiological basis of behavior, including considerations of sensory phenomenon, motor coordination, emotion, drives, and the neurological basis of memory.
Prerequisite: PSYC301.
Additional Information: Priority is given to PSYC majors.

PSYC403 Animal Behavior (3 Credits)
Reviews the theoretical framework underlying the study of animal behavior. The genetic, hormonal and physiological basis of behavior, and the relation to ecological and evolutionary processes will be discussed using examples that range from invertebrate animals to humans.
Prerequisite: PSYC301.

PSYC404 Introduction to Behavioral Pharmacology (3 Credits)
Theoretical viewpoints on the interaction of drugs and behavior. Basic principles of pharmacology, the effects of drugs on various behaviors, experimental analysis of drug dependence and abuse, and neuropharmacology and behavior.
Prerequisite: PSYC301.
Restriction: Must be in Psychology program.

PSYC406 Neuroethology (3 Credits)
A merger between the disciplines of neuroscience and ethology (animal behavior) studies the behavioral functions of nervous systems using a comparative and evolutionary approach. Students will learn how the nervous system controls behavioral patterns in a variety of different organisms ranging from insects to mammals.
Prerequisite: PSYC301.
Restriction: Must be in Psychology program.

PSYC407 Behavioral Neurobiology Laboratory (4 Credits)
How does the nervous system control behavior? We will address this question using simple behavioral experiments combined, in some exercises, with microsurgery and electrode recordings in the nervous system. Concepts studied will include CNS plasticity, the role of proprioception in controlling movement, cortical processing and the myth multitasking, sensory resolution by measuring receptive field sizes, activity of simple neural circuits controlling escape from predators, and the effects of neuromodulators on aggression. Animals used are all invertebrates.
Prerequisite: PSYC300 and PSYC301; and permission of instructor.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC409 Topics in Neurosciences Seminar (1 Credit)
Current research in neurosciences will be presented, read, and discussed. Emphasis will change each term.
Restriction: Permission of BSOS-Psychology department; and junior standing or higher.
Repeatable to: 4 credits if content differs.

PSYC411 Introduction to Functional Magnetic Resonance Imaging (3 Credits)
An introduction to functional magnetic resonance imaging (fMRI). Students will be taught about formulating testable hypotheses with fMRI, utilizing basic methods in fMRI studies, and understanding existing limitations of fMRI studies in the literature.
Prerequisite: PSYC200, PSYC301, and PSYC300.
Restriction: Must be in a major within BSOS-Psychology department.
Credit Only Granted for: PSYC309N or PSYC411.
Formerly: PSYC309N.

PSYC413 Developmental Cognitive/Social Neuroscience (3 Credits)
Developmental cognitive/social neuroscience is the study of how the brain underlies the acquisition, refinement, and maintenance of complex cognitive and social abilities. The goal of this course is to gain an understanding of current research, methods, and theories in developmental cognitive/social neuroscience through lecture and discussion.
Prerequisite: PSYC355 or PSYC301; or permission of instructor.
Restriction: Restricted to psychology majors and neuroscience minors during the registration period. All other students can reserve a position on the hold file, and will be offered a seat on a space-available basis.
Credit Only Granted for: PSYC309D, PSYC309H, or PSYC413.
Formerly: PSYC309D, PSYC309H.

PSYC414 Science of Sleep and Biological Rhythms (3 Credits)
Sleep is a powerful, inescapable, misunderstood, and mysterious presence in our lives. The course will begin with a review the of the basics of sleep and biological rhythms with a focus on the underlying neurobiology. The bulk of the semester will be in-depth discussions of topics in sleep and circadian rhythms primarily chosen by the students. A few examples: narcolepsy, sleep in primitive cultures, lucid dreaming, racial and cultural differences in sleep and sleep disorders, the biology of sleep and circadian rhythms during adolescence, CNS control of dreaming, sleep and states of consciousness, sleeping to remember vs. sleeping to forget, legal ramifications of parasomnias, e.g. sleepwalking, and the relationships between sleep deprivation and obesity.
Prerequisite: Permission of instructor; or (PSYC100 and PSYC301).
Restriction: Must be in a major within the BSOS-Psychology department; and restricted to psychology majors during the registration period. All other majors will be placed on a hold file.

PSYC416 Development of Attachment in Infancy and Childhood: Theory, Research, Methods, and Clinical Implications (3 Credits)
Overview of the development of attachment during infancy and childhood, examining theory, research methods, research findings, and clinical implications. Students will observe videos of attachment assessments, lead class discussion of readings, make class presentations, and complete writing assignments.
Prerequisite: PSYC355; or permission of instructor.
Restriction: Must be in a major within the BSOS-Psychology department.
Credit Only Granted for: PSYC309J or PSYC416.
Formerly: PSYC309J.

PSYC420 Experimental Psychology: Social Psychology Laboratory (4 Credits)
A laboratory course to provide a basic understanding of experimental method in social psychology and experience in conducting research on social processes.
Prerequisite: PSYC300 and PSYC221.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC423 Advanced Social Psychology (3 Credits)
A systematic review of research and points of view in regard to major problems in the field of social psychology.
Prerequisite: PSYC420.

PSYC424 Communication and Persuasion (3 Credits)
Effect of social communication upon behavior and attitudes. Theory and research concerning attitude change and social influence.
Prerequisite: PSYC221 and PSYC200.

PSYC425 Psychology and Law (3 Credits)
An introduction to the intersection of psychology and the criminal justice sytem, known as the field of legal psychology. The material covered will span the course of the criminal justice process and examine each aspect from a psychological perspective beginning with profiling and moving on to eyewitness memory and judgements through perpetrator memories and interrogation techniques. These apsects will be evaluated with a research lens as well as an applied outlook.
Prerequisite: PSYC100, PSYC200, and PSYC300.
Restriction: Must be in Psychology program.
Credit Only Granted for: PSYC309K, PSYC325, or PSYC425.
Formerly: PSYC309K.

PSYC432 Counseling Psychology: Theories, Research, and Practice (3 Credits)
Analysis of research and intervention strategies developed and used by counseling psychologists. Historical and current trends in content and methodology.
Prerequisite: PSYC200.

PSYC433 Basic Helping Skills: Research and Practice (4 Credits)
Theories and research regarding effective helping relationships, with a focus on applications to counseling and psychotherapy. Students will practice helping skills with each other and will conduct research projects evaluating their helping skills. Students should be willing to talk about personal issues in class. Attendance in labs is mandatory and contributes to the course grade; thus, students should only enroll in a lab section that they will be able to attend consistently.
Prerequisite: PSYC300.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits; and must not have completed or be concurrently enrolled in EDCP 310.
Credit Only Granted for: EDCP210, EDCP310, or PSYC433.

PSYC435 Theories of Personality and Psychotherapy (3 Credits)
Major theories of personality and research methods and findings relevant to those theories.
Prerequisite: PSYC200.

PSYC436 Introduction to Clinical Psychology: From Science to Practice (3 Credits)
Critical analysis of clinical psychology, with particular emphasis on current developments and trends.
Prerequisite: PSYC300.

PSYC437 The Assessment and Treatment of Addictive Behaviors (3 Credits)
Explores the current research in assessment and treatment of addictive behaviors. Topics may include addictions in the areas of alcohol, drugs, nicotine, gambling, and eating.
Prerequisite: PSYC100; and 9 credits in PSYC courses.
Credit Only Granted for: PSYC309E (taken in the Winter Term) or PSCY437.
Formerly: PSYC309E.

PSYC438 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

PSYC440 Experimental Psychology: Cognitive Processes and Legal Applications (4 Credits)
A survey of the content, models, and methods in cognitive psychology with an emphasis on attention and encoding, recall, recognition, judgment, signal detection theory, and applying cognitive theories to situations in the legal system. Students integrate scientific theories with real-life legal situations. Course topics include research methodology in assessing and addressing cognitive mechanisms and how this understanding may help eyewitness and victim recall and recognition, perpetrator recall, assessing scientific theories of repression, and real life examples.
Prerequisite: PSYC341 and PSYC300.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC442 Psychology of Language (3 Credits)
Introductory survey of the psychology of language, focusing on the cognitive processes that enable us to produce and understand language. Topics include speech perception, speech production, syntactic processing, language development, language disorders, and the brain bases of language.
Prerequisite: PSYC300 and PSYC341.
Restriction: Must be in Psychology program.

PSYC444 Cyberpsychology: The Psychology of Human/Computer Interactions (3 Credits)
Explores traditional psychological processes in the rapidly changing world of computer and internet technologies. Students will address how the use of computers impacts many of the major topics in psychology.
Prerequisite: PSYC200.
Credit Only Granted for: PSYC309E or PSYC444.
Formerly: PSYC309E.

PSYC445 The Psychology of Video Games and Entertainment (3 Credits)
An exploration of the diverse elements and theories in the psychology of video games and entertainment. The history and taxonomy of video games, cognitive and affective elements, virtual reality and social presence, video game violence, and educational and ethical issues will be covered.
Prerequisite: PSYC200.
Restriction: Must be in Psychology program; or permission of BSOS-Psychology department.
Credit Only Granted for: PSYC309V or PSYC445.
Formerly: PSYC309V.

PSYC450 Field Research in Organizational Psychology (4 Credits)
Methods of field research applicable to organizational settings are examined, including field experiments and quasi-experiments, observation, interviewing, surveys, content analysis, and various forms of qualitative inquiry.
Prerequisite: PSYC300 and PSYC361.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC455 Cognitive Development (3 Credits)
Theory and research on cognition from a developmental perspective. This discussion-based seminar will emphasize readings on infancy through early childhood. Topics will include general abilities such as memory and categorization, as well as children's emerging knowledge about the physical and social worlds.
Prerequisite: PSYC300; and PSYC355. Or permission of instructor.
Restriction: Must be in Psychology program.

PSYC456 Research Methods in Developmental Psychology Laboratory (4 Credits)
A presentation of major research designs used in developmental psychology and of the methodology used in developmental research, such as observational research, program evaluation, and laboratory experimentation.
Prerequisite: PSYC300; and permission of BSOS-Psychology department.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC457 Consensual Qualitative Research Methods Laboratory (4 Credits)
An exploration of philosophy of science and methods involved in qualitative research methods in counseling psychology, along with a comparison to quantitative research methods. The laboratory component involves conducting a qualitative study, including reviewing the literature, designing an interview protocol, training to conduct interviews, conducting interviews, analyzing the data, and writing a manuscript.
Prerequisite: PSYC200 and PSYC300; and permission of BSOS-Psychology department.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.
Credit Only Granted for: PSYC457 or PSYC498H (taken in Fall 2010 or Fall 2011).
Formerly: PSYC498H.

PSYC460 Psychological Foundations of Personnel Selection and Training (3 Credits)
An examination of issues and processes involved in the design and evaluation of personnel selection and training programs in a variety of organizational settings: job, person and organizational analysis; organizational choice; development of predictors; evaluation of instructional and training systems; criteria for performance evaluation, promotion and training.
Prerequisite: PSYC361 and PSYC200.

PSYC468 Field Experience and Special Assignments in Honors (1-3 Credits)
An individual experience arranged by the honors student and his or her supervisor. A proposal submitted to the honors faculty in the semester preceding registration for the course should state the activities anticipated and the method of evaluation.
Prerequisite: Must have permission of supervisor and honors faculty.
Restriction: Permission of BSOS-Psychology department.
Repeatable to: 6 credits.

PSYC469 Honors Thesis Proposal Preparation (3 Credits)
Development of honors thesis proposal by preliminary research and literature review. Presentation of formal proposal to the thesis committee.
Restriction: Permission of BSOS-Psychology department.
Repeatable to: 3 credits.

PSYC478 Independent Study in Psychology (1-3 Credits)

PSYC479 Special Research Problems in Psychology (1-3 Credits)

PSYC488 Advanced Psychology I (Honors) (3 Credits)
Seminar covering topics in sensation, perception, learning, and motivation.
Prerequisite: PSYC200.
Restriction: Permission of BSOS-Psychology department.

PSYC489 Advanced Special Topics in Psychology (3 Credits)
Treatment of a specialized topic in psychology.
Prerequisite: PSYC300.
Repeatable to: 9 credits if content differs.

PSYC498 Advanced Psychology II (Honors) (3 Credits)
Seminar covering topics in measurement, social processes, developmental processes and other subject matter of current interest.
Prerequisite: PSYC488; or permission of BSOS-Psychology department.

PSYC499 Honors Thesis Research (3 Credits)

PSYC601 Quantitative Methods I (4 Credits)
A basic course in quantitative/mathematical analysis and statistical methods in psychology with an emphasis on conceptual understanding. Topics include issues in measurement, probability theory, statistical inference and hypothesis testing, parameter estimation, bivariate regression, and correlation.
Prerequisite: PSYC200; or students who have taken courses with comparable content may contact the department.

PSYC602 Quantitative Methods II (4 Credits)
A continuation of PSYC 601. Topics include experimental design, analysis of variance, analysis of covariance, multiple regression, and general linear models.
Prerequisite: PSYC601.

PSYC603 Introduction to Industrial and Organizational Psychology (3 Credits)
Advanced survey of industrial-organizational psychology, including selection, training, motivation, group processes, leadership, organizational psychology, and organizational theory. Readings stressed and seminar time will be used for lectures, discussion and integration of the reading materials.
Credit Only Granted for: PSYC603 or PSYC730.
Formerly: PSYC730.

PSYC604 Fundamentals of Social Psychology (3 Credits)
A survey of classic and contemporary theories, research and methods in social psychology.
Credit Only Granted for: PSYC604 or PSYC640.
Formerly: PSYC640.

PSYC606 Human Biopsychology (3 Credits)
An introductory graduate level course in human psychobiology designed for graduate students with little specific training in this area. Introduction to the comparative and evolutionary approach to the study of human behavior, the biobehavioral basis of human sexuality and social behavior, the physiological basis of higher cortical functions in humans including language, memory, and spatial perception, and an introduction to neuropharmacology.
Credit Only Granted for: PSYC606 or PSYC660.
Formerly: PSYC660.

PSYC607 Advanced Topics in Human-Learning and Cognitive Psychology (3 Credits)
A systemic review of major topic areas in the field of human learning and cognition, with emphases on information processes, mental representations, memory, reasoning, problem solving, and language.
Credit Only Granted for: PSYC607 or PSYC671.
Formerly: PSYC671.

PSYC610 Historical Viewpoints and Current Theories in Psychology (3 Credits)
Origins of psychology in philosophy and the sciences; the development of psychology as a science in the nineteenth and twentieth centuries. A review of current theoretical perspectives and research in relation to the enduring issues in psychology. The role of culture, science, and technology in the development of psychological ideas.
Credit Only Granted for: PSYC610 or PSYC688.
Formerly: PSYC688.

PSYC611 Advanced Developmental Psychology (3 Credits)
Systematic exploration of contemporary and classic theories of development focusing on the assumptions they make and research they generate.

PSYC612 Affective Science Perspectives on Temperament & Personality (3 Credits)
Scientific requirements for a personality theory. Postulates and relevant research literature for several current personality theories.

PSYC619 Research Team in Clinical Psychology (1-3 Credits)
Participation in ongoing faculty-student research teams focusing on discussion of research topics, presentation and critique of original research proposals, and development of thesis and dissertation research studies.
Repeatable to: 6 credits.

PSYC622 Research Methods in Clinical Psychology (3 Credits)
Examines issues and strategies in conceptual systems, designs and methodologies of current research in clinical and community psychology. Readings include critical analyses of published research. Course requirements include preparation of a research proposal for a thesis level study.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC622 or PSYC718.
Formerly: PSYC718.

PSYC623 Child Psychopathology (3 Credits)
Examines the scientific and clinical literature relevant to normal and pathological behavior in children and adolescents. Issues in developmental psychopathology and consideration of processes initiated in childhood which manifest as pathology in adulthood are also considered.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).

PSYC624 Adult Psychopathology (3 Credits)
Examines the scientific and clinical literature relevant to normal and pathological behavior in adults and associated nosological systems for categorizing psychopathology. Issues relevant to etiology, differential diagnosis, and treatment planning are also considered.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).
Credit Only Granted for: PSYC624 or PSYC719.
Formerly: PSYC719.

PSYC625 Clinical Assessment: Psychometric Principles, Testing and Behavior (3 Credits)
An examination of fundamental principles of psychological assessment; application of these principles to the development of evidence-based assessments of clinical conditions and associated behaviors; and application of evidence-based assessments to the evaluation and understanding of clinical conditions evaluated and treated in therapeutic settings.
Restriction: Permission of BSOS-Psychology department.
Credit Only Granted for: PSYC625 or PSYC721.
Formerly: PSYC721.

PSYC628 Advanced Topics in Clinical Psychology (1-3 Credits)
Examines selected topics in clinical/community psychology, public policy and health care planning.
Restriction: Permission of instructor.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: PSYC628 or PSYC719.
Formerly: PSYC719.

PSYC629 Clinical Laboratory (1-3 Credits)
Provides advanced supervised experience in the delivery and supervision of mental health interventions targeted to individuals. Supervised work with clients is required.
Repeatable to: 15 credits.
Credit Only Granted for: PSYC629 or PSYC632.
Formerly: PSYC632.

PSYC630 Behavioral and Cognitive Behavioral Intervention for Adults (3 Credits)
Introduces students to the process of therapy with particular focus on behavioral focus on behavioral and cognitive behavioral internentions. Syllabus focuses on theory, research, client diversity, ehtics, and practical aspects of conducting therapy.
Prerequisite: PSYC680.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC630 or PSYC728.
Formerly: PSYC728.

PSYC632 Behavioral and Cognitive Behavioral Intervention for Children and Adolescents (3 Credits)
Introduces students to the process of therapy with particular focus on behavioral and cognitive behavioral interventions in children and adolescents. Syllabus focuses on theory, research, client diversity, ethics and practical aspects of conducting therapy.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).
Formerly: PSYC789A.

PSYC638 Externship in Professional Psychology (1-3 Credits)
Approved appointment as an extern in a mental health setting.
Repeatable to: 6 credits if content differs.

PSYC639 Internship in Professional Psychology (1 Credit)
This seminar combines involvement with a program approved appointment as an intern in a mental setting with a supervisory review of the training experience.
Repeatable to: 6 credits if content differs.

PSYC642 Biological Considerations in Clinical Psychology (3 Credits)
Behaviors are based partially in the bilogy of the human organism. This course begins with an examination of the nature-nurture issue on psychology, particularly as it applies to clinical psycology. Genetic underpin nings of behavior & their neuroanatomical & neurochemical expressions will be explored. This course will also examine psychopsychiological meas ures and the role of psychoparmacology and other biological interventions in treatment.

PSYC643 Ethical and Professional Issues in Clinical Psychology (3 Credits)
An overview of the ethical and professional issues involved in psychological research, instruction, and practice, with special attention to advocacy and ethical decision making regarding a variety of primary, secondary, and tertiary clinical/community interventions.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).
Credit Only Granted for: PSYC643 or PSYC719.
Formerly: PSYC719.

PSYC644 Basic Foundation of Clinical Interventions (3 Credits)
General introduction to behavior theory and the basic behavioral principles that underlie behavior therapy. Provides an introduction to the philosophical, theoretical and empirical contributions of basic behavior analysis as they relate to behavior therapy, including examples of how behavior therapy is disconnected from its roots.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).

PSYC650 Culture and Diversity in Mental Health (3 Credits)
Review literature regarding the role of culture and diversity in mental health and how culture and diversity are integrated into research and are related to mental health and mental health service utilization. Examine principles and concepts of multicultural and cross-cultural psychology to acquire an increased understanding of diverse underrepresented groups and topics to consider when involved with research and/or clinical work with individuals having diverse backgrounds (e.g., cultures, ethnicities, genders, sexual orientations, and socioeconomic status).
Restriction: Must be enrolled in the Clinical Psychological Science MPS program.

PSYC651 Writing and Critical Thinking (3 Credits)
A capstone experience to integrate knowledge learned throughout the program and improve critical thinking and research writing skills. This will be done through the production of a major research paper in an area relevant to the current or future career goals of the student and by emphasizing critical thinking skills.
Restriction: Must be enrolled in and have completed 4 terms of the Clinical Psychological Science MPS program.

PSYC652 Analytical Thinking: Statistical Methods at Work (3 Credits)
Personal and organizational growth begins with asking and answering great questions. Correspondingly, this course begins with demonstrations of how to translate business questions into research questions. Statistical methods used to answer business questions are taught first conceptually, then computationally using statistical software. This course emphasizes interpreting results, the regression model, and other issues salient to business research, such as handling large datasets. Students will be provided with a simulated dataset that they will use in learning how to frame and answer business questions using the techniques covered in this course. At the conclusion of this course, students will be required to provide an executive-level presentation on the business question, their findings, and resulting implications.
Additional Information: Students will be taught how to conduct analyses in R, SPSS, SAS, Stata, and excel; students are encouraged to practice analyses on at least two of these programs.

PSYC653 The Business of Evaluation: Research Methods at Work (3 Credits)
Students will learn about the strengths and weaknesses of commonly employed research methods in business settings, including: longitudinal research, survey and interview (including focus groups) design, and sampling and weighting. Students will design and launch a research study that will answer a pressing business question.
Prerequisite: PSYC652.
Additional Information: Course builds from work completed in PSYC 652. Students are also expected to commit to a two-term long project. Students will work with a non-profit organization or local business to ask and answer a business question for the organization. Students will conclude this project in PSYC 654.

PSYC654 Advanced Analytical Thinking: Statistical Methods at Work II (3 Credits)
Students will delve deeply into issues of interpreting and questioning analytic results. Students will learn how to creatively present empirical results in ways that grab the attention of, and are clear to, a variety of stakeholders. Students will present group projects in two presentations, one to the rest of the class (technical audience) and one to an expert panel of practitioners. Finally, this course will introduce students conceptually to a number of advanced statistical methods, such as meta-analysis and structural equation modeling.
Prerequisite: PSYC652 and PSYC653.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC655 Talent Development (3 Credits)
In this course, students will learn how to design and implement effective employee training programs as well as how to encourage informal learning in organizations. This course will review current theories in adult learning (e.g., ADDIE model, action learning, peer feedback/coaching), several popular assessment tools (e.g., MBTI), and best practices for evaluating training programs. Issues relevant to leadership identification and development, including succession planning, will also be covered. As part of this course, students will work in teams to design and deliver a brief training module and practice giving and receiving feedback. Additionally, students will complete, and facilitate a debriefing on, a 360-degree feedback assessment.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC656 Business Fundamentals and Legal Issues facing Organizations (3 Credits)
This course provides an overview of the fundamentals of business, including both issues of finance and legal issues faced by organizations. Topics will include finance, accounting, and marketing. Students will learn core business concepts, about how each major business function enables organizations to run, and how to talk to and understand the leaders of organization. Additionally, this course will provide an overview of common legal challenges organizations face. In addition to introducing students to employment law, this course will review professional ethics standards for IO psychology. This course will use case study methodology to hone students' understanding of the ethical and legal issues faced in day-to-day organizational life.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC657 Managing Strategic Organizational Change (3 Credits)
In this course, students will learn to think about organizations as systems and will explore catalysts of organizational change. Issues of strategy, market pressure, competition, workforce planning, and stakeholder buy-in will be discussed. Finally, students will learn about methods for planning, leveraging, and managing organizational change. Case study methodology will be used to deepen learning on the challenges faced during organizational change and how to guide organizations through change, planned or not.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC660 Performance Management, Compensation, and Benefits (3 Credits)
This course draws together content on organizational behavior, selection, assessment, development, employee relations, and compensation, among other topics. Students in this course will learn about how to align organizational reward systems, including selection, development, performance appraisal, feedback, and compensation systems. This course will pull from current organizational research and theory on issues ranging from work motivation, employee retention, and feedback processes to issues of organizational strategy and culture.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC661 Practicum in IO Psychology (3 Credits)
In this practicum, students will work on IO-related tasks in an organization and will have the opportunity to apply what they have learned in class to real-world problems. Students will write a reflection paper reviewing what skills they have applied - and developed - while completing this practicum.
Prerequisite: PSYC603, PSYC652, PSYC653, and PSYC654.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC662 Understanding Trauma and Recovery I (3 Credits)
This course is designed to provide students with an overview of psychological trauma and an introduction to treatment of trauma survivors. Current theoretical approaches to understanding trauma and treatment from psychological, developmental, neurobiological, cognitive, and ecological perspectives will be presented.
Restriction: Must be in the Graduate Certificate of Professional Studies in Treating Survivors of Violence, Torture, and Trauma: Theoretical Foundations and Mental Health; or permission of instructor.

PSYC663 Understanding Torture and Trauma I (3 Credits)
The focus of this course is to provide students with an introduction to the psychology of torture survivors. Students will discuss theoretical approaches to understanding of torture, think critically about the context of torture, and understand the psychological, social/familial, spiritual, physical, community, and political implications of torture. Interventions for working with torture survivors will be introduced.
Restriction: Must be in the Graduate Certificate of Professional Studies in Treating Survivors of Violence, Torture, and Trauma: Theoretical Foundations and Mental Health; or permission of instructor.

PSYC664 Understanding Trauma and Recovery II (3 Credits)
This is the second in a series of two courses designed to provide students with an understanding of psychological trauma and treatment of trauma survivors. Current approaches to understanding and treating trauma survivors from psychological, developmental, neurobiological, cognitive, and ecological perspectives will be presented.
Prerequisite: PSYC662.
Restriction: Must be in the Graduate Certificate of Professional Studies in Treating Survivors of Violence, Torture, and Trauma: Theoretical Foundations and Mental Health; or permission of instructor.

PSYC665 Understanding Torture and Trauma II (3 Credits)
This is the second course in a searies of two classes focused on theory, research, and psychological interventions related to the treatment of survivors of torture and trauma. Current approaches to treatment of torture survivors, as well as psychological, social/familial, spiritual, physical, community, and political implications of torture will be introduced.
Prerequisite: PSYC663.
Restriction: Must be in the Graduate Certificate of Professional Studies in Treating Survivors of Violence, Torture, and Trauma: Theoretical Foundations and Mental Health; or permission of instructor.

PSYC669 Professional Issues in Counseling Psychology (1 Credit)
Introduction to counseling psychology, including history and development of the field, and current professional and scientific issues. Exploration of career, research, and professional development opportunities.
Restriction: Must be in the Counseling Psychology program.
Repeatable to: 3 credits if content differs. Also offered as: EDCP669.

PSYC672 Introduction to Addiction and Co-occurring Conditions (3 Credits)
An in-depth overview of the range of addictive behaviors and the psychological conditions that often co-occur and complicate the presentation and course of addictive behaviors.
Restriction: This course is reserved for students enrolled in the Graduate Certificate Program in Addiction Science and Intervention.

PSYC678 Seminar in Psycholinguistics (3 Credits)
Contemporary psycholinguistic theories of language acquisition and use. Phonological, semantic and syntactic aspects of language.
Prerequisite: PSYC671.
Repeatable to: 6 credits.

PSYC679 Seminar in Cognitive Development (3 Credits)
Advanced coverage of research methodology and research issues in various areas of cognitive development such as categorization, spatial understanding, language acquisition, and memory. Emphasis on interrelationships among developmental changes across the life-span. Utility of a developmental perspective in analyzing the components of cognition.
Prerequisite: PSYC611 or PSYC671.
Repeatable to: 6 credits.

PSYC682 Counseling Psychology Didactic-Practicum in Group Interventions (3 Credits)
In depth examination of theories and techniques of group interventions, and supervised experience in group counseling.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC682 or PSYC729.
Formerly: PSYC729.

PSYC683 Counseling Psychology Didactic-Practicum in Couples and Family Interventions (3 Credits)
In depth examination of theories and techniques of couples and family counseling, and supervised experience in couples/family counseling.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC683 or PSYC729.
Formerly: PSYC729.

PSYC688 Ethicial and Legal Issues in Counseling Psychology (1 Credit)
Exploration of ethical standards and legal issues in the profession of counseling psychology.
Restriction: Must be in the Counseling Psychology program.
Repeatable to: 3 credits if content differs.

PSYC689 Seminar in Counseling Psychology (3 Credits)
Special topics in counseling psychology. Examples of topics include multi-cultural counseling, the counseling relationship, counseling and victimology, psychological treatment and health.
Restriction: Permission of instructor.
Repeatable to: 12 credits if content differs.
Credit Only Granted for: PSYC689 or PSYC719.
Formerly: PSYC719.

PSYC690 Research in Counseling Psychology I (3 Credits)
Critical analysis of strategies methodological, conceptual, and content trends.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC690 or PSYC718.
Formerly: PSYC718.

PSYC691 Research in Counseling Psychology II (3 Credits)
Critical analysis of trends and issues in counseling psychology science.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC691 or PSYC718.
Formerly: PSYC718.

PSYC692 Assessment in Counseling Psychology I (3 Credits)
Broad introduction to the construction of psychological tests and measures, and experience in test interpretation, with consideration of historical, legal, ethical, and cultural issues surrounding the assessment process.
Prerequisite: PSYC680.
Credit Only Granted for: PSYC692 or PSYC721.
Formerly: PSYC721.

PSYC695 Ethical and Professional Issues in Counseling Psychology (3 Credits)
Exploration of ethical and professional issues in Counseling Psychology.
Restriction: Must be in the Counseling Psychology program. Also offered as: EDCP695.
Credit Only Granted for: EDCP669, EDCP688, EDCP695, PSYC688, or PSYC695.
Formerly: EDCP669 and EDCP688.

PSYC698 Advanced Didactic-Practicum in Counseling Psychology (3 Credits)
In depth examination of approaches to or theories about intervention, and supervised experience in the application of those approaches or theories. Each practicum focuses on a particular approach, e.g, psychodynamic, cognitive-behavioral, cross-cultural.
Restriction: Permission of instructor.
Repeatable to: 12 credits if content differs.
Formerly: PSYC729.

PSYC699 Diversity and Multiculturalism in Counseling Psychology (1 Credit)
Exploration of knowledge, attitudes, and skills for providing counseling psychological services to culturally diverse populations.
Restriction: Must be in the Counseling Psychology program.
Repeatable to: 3 credits if content differs.
Formerly: EDCP696.

PSYC700 Theories and Strategies of Counseling Psychology (3 Credits)
Introduction to the professional field, examination of pertinent scientific and philosophical backgrounds, and survey of the major theories, principles, and training models in counseling. Correlated laboratory analogue experiences in dyadic and group interrelationships.
Restriction: Permission of BSOS-Psychology department.
Credit Only Granted for: PSYC700 or PSYC711.
Formerly: PSYC711.

PSYC707 Theory of Decision and Choice (3 Credits)
A study of algebraic and probabilistic models for decision and choice behavior, and related experimental procedures. Topics include: measurement of preference, subjective utility models for certain and uncertain outcomes, normative strategies, decision making styles, and group decision making.
Prerequisite: PSYC602.
Restriction: Permission of instructor.

PSYC708 Seminar in Psychometric Theory (3 Credits)
Study of the current practices, trends, or recent developments in psychometric theory.
Prerequisite: PSYC602; or permission of instructor.
Repeatable to: 9 credits if content differs.

PSYC709 Seminar in Mathematical Models (3 Credits)
Special topics in mathematical psychology. A discussion of quantitative representations of psychological processes in one or more substantive areas of psychology.
Prerequisite: PSYC602; or permission of instructor.
Repeatable to: 9 credits if content differs.

PSYC725 Teams at Work (3 Credits)
Theory and research regarding the formation, management, and functioning of teams in the workplace; including team composition, team rewards, team-task and team-organization relationships and fit, team productivity, and the selection for and training of teams. International use of teams at work.
Prerequisite: PSYC602; or permission of instructor.
Credit Only Granted for: PSYC725 or PSYC747.
Formerly: PSYC747.

PSYC732 Selection and Classification Issues in Organizations (3 Credits)
Consideration of societal, organizational and individual demands for appropriate use of individual differences in (primarily) initial placement of employees. Recruitment, and selection issues, the role of governmental regulations, and the role of individual factors in individual behavior are considered. Extensive coverage given to fundamental psycho-metric problems and the development of individual and organizational criteria of effectiveness.
Prerequisite: PSYC603; and (PSYC602; or students who have taken courses with comparable content may contact the department). Or permission of instructor.

PSYC737 Research Methods in Industrial/Organizational Psychology (3 Credits)
Philosophy, theory, and method issues underlying I/O psychology. History and the effectiveness of different methods for answering different questions is explored. Reliability and validity are emphasized.
Prerequisite: PSYC603; or permission of instructor.

PSYC738 Seminar in Industrial/Organizational Psychology (3 Credits)
An occasional advanced seminar covering specialized topics.
Prerequisite: PSYC603; or permission of instructor.
Repeatable to: 99 credits if content differs.

PSYC739 The Psychology of Workplace Change and Innovation (3 Credits)
Organizational change and innovation research and theory, current impetuses for organizational change (e.g., economic, demographic, and technological trends) and specific workplace innovations (e.g., employee ownership, QWL, CAD/CAM, etc.)
Prerequisite: PSYC603; or permission of instructor.

PSYC748 Seminar in Social Psychology (3 Credits)
A seminar on selected topics in social psychology.
Repeatable to: 15 credits if content differs.

PSYC749 Current Research in Social Psychology (1-3 Credits)

PSYC757 Developmental Cognitive Neuroscience (3 Credits)
Developmental cognitive neuroscience investigates the relations between neural and cognitive development. This course provides an overview of current research questions, methodologies and findings related to neurocognitive development in human infants and children, the role of developmental plasticity, and atypical outcomes, such as those observed in neurodevelopmental disorders.
Restriction: Must be in one of the following programs (Psychology (Master's); Psychology (Doctoral); Neurosciences and Cognitive Sciences (Doctoral)) ; or permission of BSOS-Psychology department.
Credit Only Granted for: NACS728D or PSYC757.

PSYC758 Seminar in the Neural Bases of Sensory Processes (3 Credits)
Selected topics in vision and the other senses.
Prerequisite: PSYC605; or permission of instructor.
Repeatable to: 9 credits if content differs.

PSYC759 Seminar in Neural Bases of Perceptual Processes (3 Credits)
Selected topics in perceptual phenomena and their physiological bases.
Prerequisite: PSYC605; or permission of instructor.
Repeatable to: 9 credits if content differs.

PSYC764 Comparative Neuroanatomy (3 Credits)
Demonstrations and lectures on the gross, microscopic and ultrastructural morphology of the central nervous system of vertebrates.
Restriction: Permission of instructor.

PSYC768 Conditioning and Learning (3 Credits)
Alternate years. The literature on the experimental analysis of behavior, with examination of basic experiments and contemporary theories related to them.
Prerequisite: PSYC622.

PSYC778 Seminar in Learning and Memory (3 Credits)
An advanced topical seminar covering the areas of human learning and memory. Acquisition processes, storage and retrieval processes, and attention and information processing.
Prerequisite: PSYC671.
Repeatable to: 6 credits if content differs.

PSYC779 Seminar in Human Performance Theory (3 Credits)
An examination of human-machine interactions with emphasis on theories and research which focus on human performance capabilities and skills. Topics selected from information processing, communications, human computer interaction, decision making, environmental constraints and automation.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.
Formerly: PSYC735.

PSYC788 Special Research Problems (1-4 Credits)
Supervised research on problems selected from the areas of experimental, industrial, social, quantitative, or mental health psychology.

PSYC789 Special Research Problems (1-4 Credits)

PSYC798 Graduate Seminar (1-4 Credits)

PSYC799 Master's Thesis Research (1-6 Credits)

PSYC818 Research Issues in Personality Or Development (3 Credits)
Experimental design and methodology and statistical treatment of data appropriate to personality or developmental research; critical analysis of major current areas of research including methodologies, findings and implications. The course will focus on either personality research or developmental research in a given semester.
Prerequisite: PSYC602 and PSYC601. And PSYC611 or PSYC612; or students who have taken courses with comparable content may contact the department.
Repeatable to: 9 credits.

PSYC819 Seminar in Personality and Development (3 Credits)
An advanced seminar covering specialized topics.
Repeatable to: 9 credits.

PSYC859 Special Topics in Perception (3 Credits)
Intensive study of selected topics in perception.
Prerequisite: PSYC605; or permission of instructor.
Repeatable to: 6 credits.

PSYC878 Current Research in Language and Cognition (3 Credits)
Seminar will cover current research and methodological issues in language and cognition. Specialized topics include: computer models of cognitive behavior; cross-cultural studies in language and thought; mathematical and analytical techniques for assessing structures; and others.
Prerequisite: PSYC671.
Repeatable to: 6 credits.

PSYC888 Research Methods in Psychology (1-3 Credits)

PSYC889 Research Methods in Psychology (1-3 Credits)

PSYC898 Pre-Candidacy Research (1-8 Credits)

PSYC899 Doctoral Dissertation Research (1-8 Credits)

PUAF - Public Policy

PUAF610 Quantitative Aspects of Public Policy (3 Credits)
Introduces statistical methods needed for evaluating and choosing among policy options. Topics include probability; decision-making under uncertainty; the organization, interpretation, and visual display of complex data; prediction and inferences about causality; hypothesis testing; and linear and multiple regression. Develops analytical skills and the ability to apply theory to complex, real-world problems.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF611 Quantitative Analysis of Policy Issues (3 Credits)
Study of a series of problems and the development of quantitative techniques to describe or evaluate the problem. The organization and interpretation of complex data and its use for prediction and inference about casual effects. The definition of objectives, trade-offs among objectives, and allocation of resources to meet objectives. Sensitivity of outcomes to changing conditions.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF620 Political Analysis (3 Credits)
Examination of politics as a process for allocating scarce resources among claimants for public benefits. Comparision of the allocative model of politics with other distributive processes, such as markets. Comparison of the model with behavior of different political institutions, such as Congress and the presidency. Study of politics as a process with distinctive concepts of rationality. The translation of voter and interest group preferences into public choices. The impact of political decisions on competing constituencies.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF640 Microeconomic and Policy Analysis (3 Credits)
Applies intermediate microeconomic theory to public policy issues: resource allocation by firms and consumers; the response of economic agents to changes in incentives; market allocations in competitive and non-competitive environments; and market failures and government remedies. Uses extended case studies of particular issues in such areas as the environment (acid rain), international trade (tariffs), industry regulation (cable TV), and the provision of public goods (highways).
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF641 Macroeconomics and Policy Analysis (3 Credits)
Studies the behavior of the economy as a whole: the level of national income, unemployment, and inflation; the vulnerability of the U.S. economy to external influences; possible federal influence over the level of economic activity; and the consequences for prices, employment and the U.S. trade deficit. Also examines possible U.S. policy responses to widespread debt crises in developing countries.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF650 Moral Dimensions of Public Policy (3 Credits)
Explores the moral issues involved in public policy questions; the limits and usefulness of decision-making tools; problems of choosing, justifying and using criteria to judge a program's success and suitability; ethichal issues involving the welfare state and income distribution; and possible obligations beyond one's political community and generation.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF670 Public Budgeting & Financial Management (3 Credits)
Covers how governments raise, spend, borrow, and manage public funds. Reviews federal,state, and local budget processes and introduces analytical techniques including basic spreadsheet skills, evaluating alternative revenue sources, revenue and expenditure forecasting, cost allocation, capital budgeting, cost-benefit analysis, discounting and present value, bond analysis, cash management and intergovernmental finance.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF671 Public Sector Finance (3 Credits)
The goal of this course is to provide a useful overview of basic public sector financial management principles in a simulated managerial situation to midcareer students currently working in government and nonprofit organizations.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF688 Topics in Public Policy (1-3 Credits)
Special topics in Public Policy.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of instructor.
Repeatable to: 18 credits if content differs.

PUAF689 Public Policy Topics (1-3 Credits)
Special Topics in Public Policy.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of instructor.
Repeatable to: 18 credits if content differs.

PUAF692 Leadership Principles and Practices (3 Credits)
This course will introduce leadership principles and practices to students by focussing on the theory of leadership, different leadership themes and skills, and discussions with practitioners.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF698 Selected Topics in Public Affairs (1-3 Credits)
Special topics that arise in public policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY698 and PUAF698.
Formerly: PUAF698.

PUAF699 Selected Topics Public Policy (1-3 Credits)
Special topics that arise in public policy.
Restriction: Must be in a major in PUAF-School of Public Policy; and permission of PUAF-School of Public Policy.

PUAF700 U.S. Trade: Policy and Politics (3 Credits)
Interplay between government and private interests in shaping official actions that affect international trade. Policy tools available to influence balance, magnitude, and composition of imports and exports. Evolution of executive, congressional and quasi-judicial government institutions under increased U.S. international trade exposure and trade deficit.
Prerequisite: PUAF641, PUAF620, and PUAF640.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF706 Public Policymaking for Journalists (3 Credits)
Focuses on the political, procedural and administrative realities of policy formation and implementation. Specifically for the Journalism students who staff the Capital News Service.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism.

PUAF711 Public Management and Leadership (3 Credits)
Reviews the managerial, political, and ethical problems faced by public sector managers and leaders, including setting an organization's goals, obtaining and protecting a program mandate, designing a service delivery system and implementing a new program.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF712 Analysis of Fiscal Conditions (3 Credits)
The financial operations of U.S. government at various levels, with emphasis on local governments. Practical problems in revenue management, including revenue forecasting and cash flow analysis; debt management operations, such as borrowing; intergovernmental financial operations, such as grants management and reporting requirements, and personnel management issues that have a direct bearing on governmental finances.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF715 Government and Non-Profit Accounting (3 Credits)
Basic accounting practices of governmental and non-profit organizations. Emphasis on presentation of data in assessing an organization's financial health, financial data by organizations, structuring of accounting information to achieve management control, way in which evolving national standards influence kinds of information organizations have to apply in the future.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF716 State and Local Government Budgeting (3 Credits)
State and local government practices as a laboratory for studying public sector financial management.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF717 Federal Budgeting: Policy and Process (3 Credits)
Budgeting as a political and administrative instrument of government. Development of budgeting, the multiple uses of the budget, including role in fiscal policy and resource allocation, the roles and relationships of major participants, and effects of resource scarcity on budgeting behavior. Emphasis on the federal level.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF720 International Security Policy (3 Credits)
Reviews the principal features of international security as currently practiced. Traces the evolution of contemporary policy beginning with the initiation of nuclear weapons programs during World War II. Particular emphasis is given to experience of the United States and Russia, since the historical interaction between these two countries has disproportionately affected the international security conditions that all other countries now experience.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF722 Terrorism and Democracy (3 Credits)
United States government's decision process for dealing with crises; the options available to a president for deterring and handling incidents of terrorism, and how a president can and should select between the options.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF724 Problems of Global Security (3 Credits)
Explores the international security implications of globalization, presenting evidence indicating that altered circumstances will eventually induce a major redesign of prevailing security arrangements. Includes three segments: 1) a review of the principal problems that have been the focus of established security policy and would be the context for any major adjustment of policy; 2) an assessment of relationships with the major countries where traditional problems are most acutely present; and 3) a review of the organizing principles that can be expected to emerge in the new situation.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.
Formerly: PUAF698W.

PUAF732 Policy and Politics of Education Reform (3 Credits)
Examines education reform in its historical, fiscal, cultural, and legal contexts, and the changing relationship between education and economic opportunity. Focuses on institutional and normative issues, including national standards, public school choice, charter schools, vouchers and funding equity.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF734 Foundations of Social Policy (3 Credits)
Provides an overview of government's role in social policy and the history of the development of federal and state policies with respect to welfare, aging, education, and housing. Analyzes current federal institutions and legislation in the same policy areas and the demographic history of the United States. Develops skills in analytic writing and presentation of descriptive data.
Restriction: Must be in a major in PUAF-School of Public Policy.

PUAF735 Health Policy (3 Credits)
Analyzes the origins, history, status, and future of health care as problems in political and economic theory and as puzzles in policy formation. Considers current American reform controversies in the light of several disciplines and in comparison to foreign experiences and structures.

PUAF736 Managing Social Services (3 Credits)
Focuses on managing social services across federal, state, and local jurisdictions with an emphasis on how strong management can improve results. Exposes students to management thought and philosophy as applied to different social services and social policy challanges within various operating environments and programmatic settings. The watchwords for this course are "management" and "applied".
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.
Credit Only Granted for: PUAF736 or PUAF698V.
Formerly: PUAF698V.

PUAF737 Strategies of Equality (3 Credits)
Concentrates on the institutional and political means by which disadvantaged segments of the United States population have sought to enhance their social, economic and political prospects. Race, gender and disability are the substantive focal points, with considerable attention given to the challanges of African American socio-political uplift. Also explores legislation, litigation, administration, agitation (i.e. protest), and constitutional reform. Students become familiar with alternative conceptions of equality and the modes of argument employed in different institutional and political contexts.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.
Formerly: PUAF698Y.

PUAF740 Public Policy and the Environment (3 Credits)
Surveys of major federal environmental legislation; the development and implementation of laws, and alternative ways of thinking about the relationship between humans and the environment.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF741 Global Environmental Problems (3 Credits)
Suitability of analytic tools for examining global environmental problems, human overpopulation, land abuse, ozone depletion, climate change, acid rain, loss of biological diversity, the scarcity of food, fresh water, energy and nonfuel mineral resources, and health hazards of pollutants toxic metals and radiation.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF742 Environmental Ethics (3 Credits)
Analyzes issues such as the relation between human beings and nature from the perspectives of the science, history, philosophy, and religion. Considers the bases for policies such as environmental regulation, public lands, and international conventions with respect to the environment.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF743 Ecological Economics (3 Credits)
Explores how taking account of the economic system's fundamental dependence on the environment alters conventional economic goals, priorities, theories, and prescriptions.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF744 Environment and Development (3 Credits)
Analyzes sustainable development and its conflicting interpretations. The dominant view, as expressed in the World Bank's 1992 World Development Report, is studied, along with some critical responses. Further readings on issues of population, consumption and development indicators.

PUAF745 Human Health and Environmental Policy (3 Credits)
Reviews the major human physiological systems and their integrated toxicological functions; considers key bodily defenses; and discusses classic, emerging, and ambiguous risks; in all ecological context. Applies to scientific controversy, the methods of policy formation, such as risk analysis, social-cost analysis, "outcomes" analysis, and decision analysis, all in political-economic context.

PUAF752 Managing Differences:Resolving Conflict and Negotiating Agreements (3 Credits)
Enhances the student's negotiation and leadership skills for managing differences between individuals and groups. Students study the nature of conflict, learn how to handle two and multiparty conflicts, exerting leadership where there are no hierarchy leaders, and explore the impact of facilitators and mediators on the negotiating process. Blends skill building exercises and theory discussions about the behavior of groups and individuals in groups to understand negotiation dynamics.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF753 Advanced Negotiations (3 Credits)
Deepens the student's negotiation and leadership skills for managing differences between individuals and groups. Cover conflict, escalation, dealing with intractable conflicts, sustaining agreements in inter-group conflicts, and the effects of trauma on negotiations.
Prerequisite: PUAF752.
Credit Only Granted for: PUAF698C or PUAF753.
Formerly: PUAF698C.

PUAF770 Seminar in Housing and Community Development Strategies (3 Credits)
Detailed examination of community and social policy issues relating to the construction and management of affordable housing.
Restriction: Must be in a major in PUAF-School of Public Policy.

PUAF771 Housing and Community Development Overview (3 Credits)
An overview of the housing development process. Community development context, financial analysis, analytical tools including microcomputer applications, architectural and design issues, engineering constraints.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.

PUAF772 Housing Finance (3 Credits)
Fundamentals of housing investment analysis. Structuring feasibility analyses, appraisals, pro forma statements, return on investment, leverage analysis, underwriting ratios, taxation and syndication.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.

PUAF773 Housing Clinic (3 Credits)
Issues and strategies applicable to urban, suburban, and rural areas. Field experience and a team exercise, using the case study method, will give an opportunity for concrete application of the concepts to a specific set of community problems.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.

PUAF774 Asset Management (3 Credits)
Asset manager's role at each stage of the property's life cycle and property analysis, including cash flow debt and staffing. Topics include capital needs; major building systems, costs and useful lives; marketing and outreach; and anti-crime strategies. Field trips to problem properties to perform cost/benefit analysis, diagnose potential cures, and prepare action plans.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.

PUAF780 The American Foreign Policy-Making Process (3 Credits)
Survey and analysis of the governmental institutions and processes which shape U.S. global engagement on national security and international economic issues. Particular emphasis is given to executive-congressional relations and the broader domestic roots of foreign policy.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF781 International Economic Policy (3 Credits)
Issues and choices facing the United States in today's global economy. Primary, but not exclusive, emphasis is given to "competitive interdependence" among advanced industrial societies.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF782 International Development Economics (3 Credits)
Examines key current economic and policy issues for developing and transition economies. Topics include inflation stabilization, fiscal policy, selected trade issues, dealing with international capital flows, the role of multilateral organizations, such as the International Monetary Fund and the World Bank, and issues relating to saving, investment and growth.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.
Credit Only Granted for: PUAF698U or PUAF782.
Formerly: PUAF698U.

PUAF783 Development and Foreign Aid (3 Credits)
Examines the empirical, conceptual, and ethical dimensions of international development policies and U.S. foreign aid. What is the present character of development in poor countries/regions? How should development be conceived? What development strategies are best? What is and should be the purpose of U.S. foreign aide and development assistance?
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.
Formerly: PUAF698Q.

PUAF784 Disease, Disaster, and Development (3 Credits)
Studies development, the process by which needy people in fragile societies become self-sufficient people in resilient societies, in relation to disease and disaster, with particular attention to the developed world's response.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.
Credit Only Granted for: PUAF699D or PUAF784.
Formerly: PUAF699D.

PUAF790 Project Course (3 Credits)
Students work at a sponsoring government agency or private firm researching problem of interest to sponsor and relevant to concentration. Emphasis on problem definition, organizing information, and both oral and written presentation of results.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF798 Readings in Public Policy (1-3 Credits)
Guided readings for discussions on public policy.
Restriction: Must be in a major in PUAF-School of Public Policy; or permission of PUAF-School of Public Policy.

PUAF898 Pre-Candidacy Research (1-8 Credits)

PUAF899 Doctoral Dissertation Research (1-8 Credits)

RDEV - Real Estate Development

RDEV450 Foundations of Real Estate Finance and Investment (3 Credits)
Real Estate Finance and Investment addresses how real estate value is established, the fundamental foundations of the time value of money, as well as more real estate specific applications of return on investment, net operating income, the components of a real estate sources and uses statement, sources of real estate equity and debt financing, commonly used debt ratios and equity returns in real estate, as well as concepts of sensitivity analysis and exit strategies.
Prerequisite: Must have completed RDEV270 or an approved accounting course with a grade of C- or better; and minimum grade of C- in RDEV350.
Restriction: Must be enrolled in RDEV Minor; and permission of ARCH-School of Architecture, Planning, & Preservation.

RDEV478 Special Topics in Real Property Development (1-3 Credits)
RDEV 478 will address one or more current topics in real property with a focus in one or more of the areas of real estate development from planning and entitlements, to design and construction, to market analysis and valuation, to finance and investment, to operations and property management, or social and economic impacts.
Recommended: RDEV250, RDEV350, and RDEV450.
Restriction: Permission of ARCH-School of Architecture, Planning, & Preservation.
Repeatable to: 6 credits if content differs.

RDEV600 Principles and Practice of Real Property Development (3 Credits)
An introduction to basic principles of real estate development: How real estate and communities get built and how value is created. The emphasis is on entrepreneurship and an experiential learning approach to the entrepreneurial real estate development process, principles, and practice.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688T or RDEV600.
Formerly: RDEV688T.

RDEV603 Introduction to Real Property Finance (3 Credits)
Introduction to Real Property Finance addresses how real estate value is established, the fundamental foundations of the time value of money, as well as more real estate specific applications of return on investment, net operating income, the components of a real estate sources and uses statement, sources of real estate equity and debt financing, commonly used debt ratios and equity returns in real estate, as well as concepts of sensitivity analysis and exit strategies.
Restriction: Permission of the Department.
Credit Only Granted for: RDEV688Z, RDEV689V, or RDEV603.
Formerly: RDEV688Z and RDEV689V.

RDEV605 Tax and Accounting for Real Property Developers (3 Credits)
This course is designed to familiarize students with taxation and accounting as it pertains to real estate development.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688K or RDEV605.
Formerly: RDEV688K.

RDEV610 Real Property Development Law and Ethics (3 Credits)
Presents foundational knowledge about real property, contracts, administrative and constitutional law, and ethical principals and reasoning skills.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688A or RDEV610.
Formerly: RDEV688A.

RDEV615 Principles, Process and Politics of Planning for Real Property Development (3 Credits)
Designed to introduce and familiarize students with planning and zoning and the associated processes and requirements that impact the real property development process and products. It will look at the roles the community and politics play in shaping the built environment and the development process.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688G or RDEV615.
Formerly: RDEV688G.

RDEV620 Market Analysis for Real Property Development (3 Credits)
Designed to introduce and familiarize students with completing market analysis for real property projects. Includes a broad range of land uses including for-rent and for-sale residential, retail, office, and hospitality. Covers all aspects of completing a market analysis from the site visit to recommendations, and all the steps in-between. Examines how various real estate practitioners, such as developers, builders, investors, landowners, and public officials, utilize market studies.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV689M or RDEV620.
Formerly: RDEV689M.

RDEV630 Real Property Finance and Investment (3 Credits)
This course is designed to introduce students who have experience in real estate finance or have taken an introductory course in real estate finance and investment to move to this intermediate course that addresses foundational concepts of commercial real estate finance and the measures used in analyzing and evaluating real estate projects. Quantitative analysis and financial modeling comprise the main focus.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV630, RDEV688B, or URSP664.
Formerly: RDEV688B.

RDEV635 Capital Markets and Real Estate Investments for Developers (3 Credits)
An advanced course in real estate finance focusing on capital markets and complex financing mechanism in the public and private markets for raising capital for development of public, private and public/private projects.
Prerequisite: RDEV630, URSP664, or RDEV688.
Restriction: Must be in Real Estate Development (Master's) program; or permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV635 or RDEV688F.
Formerly: RDEV688F.

RDEV640 Principles of Urban Design for Real Property Developers (3 Credits)
Introduces students to the design issues associated with development of the basic real property asset classes (office, retail, and residential) and the context driven forces that shape these different development types. Also introduces non-design students to the principles of visual literacy and the capacity of different property to support development in the effort to enhance a community.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688J or RDEV640.
Formerly: RDEV688J.

RDEV650 Essentials of Design and Construction Management for Development Professionals (3 Credits)
Essential terminology, process and substantative knowledge needed by development professionals to effectively move a project through the design and construction process; includes environmental and ethical considerations throughout the process.
Restriction: Must be in Real Estate Development (Master's) program; or permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV650 or RDEV688C.
Formerly: RDEV688C.

RDEV660 Commercial Leasing for Real Property Developers (3 Credits)
Provides students with a hands-on look at commercial and real estate leases, lease provisions, and current market activity, a key factor in determining when and whether to proceed with developing a commercial property.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688L or RDEV660.
Formerly: RDEV688L.

RDEV670 Negotiating Agreements & Resolving Conflicts when Developing Real Property (3 Credits)
Designed to develop students' negotiation and leadership skills for managing differences between individuals and groups while in the process of developing and operating real property. Includes a blend of skill-building exercises and theory discussions about the behavior of individuals to understand negotiation dynamics.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688E or RDEV670.
Formerly: RDEV688E.

RDEV688 Selected Topics in Real Estate Development (3 Credits)
Selected topics in real estate development.
Prerequisite: Permission of ARCH-Real Estate Development.
Repeatable to: 8 credits if content differs.

RDEV689 Current Topics in Real Estate Development (1-3 Credits)
Explores a focused aspect in any of the five major phases of real estate development: planning, finance, law, design, construction, or management.

RDEV690 Capstone Project: Real Property Feasibility Study (3 Credits)
The capstone course is designed to provide students with an opportunity to apply acquired classroom knowledge to real world conditions. Each student in the class will work separately to create a development proposal and feasibility study for an assigned property. For students doing a feasibility study of a development the study will address at least market analysis, entitlement process, construction, and financing for the project.
Prerequisite: Completion of at least 7 RDEV courses.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688I or RDEV690.
Formerly: RDEV688I.

RELS - Religious Studies

RELS400 Methods and Theories in the Study of Religion (3 Credits)
An exploration of scholarly approaches to the study of religion. The modern history of the secular study of religion, social dynamics, textual formations, and ritual practices.Also offered as: RELS600.
Credit Only Granted for: RELS400, RELS419T,RELS600, or RELS619T.
Formerly: RELS419T.

RELS419 Advanced Topics in Religious Studies (3 Credits)
The contemporary study of religion in which topics may address specific religious traditions, regional or historical developments, or methodological and theoretical issues.
Recommended: RELS216.
Repeatable to: 9 credits if content differs.

RELS429 Advanced Topics in Religious History (3 Credits)
Advanced study of religious history in a particular setting, with attention to particular themes, texts, events, or communities.
Recommended: RELS216 or RELS289.
Repeatable to: 9 credits if content differs.

RELS430 Dead Sea Scroll (3 Credits)
A study of the Dead Sea Scrolls in their ancient and modern settings, and in terms of contemporary scholarly interpretations of their meaning. Interpretations of the historical significance of these documents, their connections to ancient Jewish sectarian movements, and their implications for our understanding of Judaism, Christianity, and the history of the Bible.
Credit Only Granted for: JWST429Q, RELS419Q, or RELS430.
Formerly: RELS419Q.

RELS439 Advanced Topics in Religious Thought (3 Credits)
Advanced study of religious thought in a particular setting, with attention to particular themes, texts, events, or communities.
Recommended: RELS216 or RELS289.
Repeatable to: 9 credits if content differs.

RELS499 Independent Study in Religious Studies (1-3 Credits)
An advanced independent research project for qualified students, supervised by a faculty member, on a topic not ordinarily covered in available courses.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 6 credits if content differs.

RELS600 Methods and Theories in the Study of Religion (3 Credits)
An exploration of scholarly approaches to the study of religion. The modern history of the secular study of religion, social dynamics, textual formations, and ritual practices.Also offered as: RELS400.
Credit Only Granted for: RELS400, RELS419T, RELS600, or RELS619T.
Formerly: RELS619T.

RELS619 Directed Readings in Religous Studies (3 Credits)
Individual Instruction course.
Repeatable to: 6 credits if content differs.

RUSS - Russian

RUSS401 Advanced Russian Composition (3 Credits)
Approaches to argumentation, organization of information, contextualized grammar, appropriateness of lexical choice, genre, and register.
Prerequisite: RUSS302; or students who have taken courses with comparable content may contact the department.
Restriction: Not open to native speakers of Russian.

RUSS402 Practicum in Written Russian (3 Credits)
Designed to improve comprehension of functional varieties of written Russian and develop ability to present in written form concise syntheses of source texts.
Prerequisite: RUSS401; or students who have taken courses with comparable content may contact the department.

RUSS403 Russian Conversation: Advanced Skills (3 Credits)
Advanced spoken production of high-level, abstract language.
Prerequisite: RUSS303; or students who have taken courses with comparable content may contact the department.

RUSS405 Russian-English Translation I (3 Credits)
Introduction to the principles of translation of a particular genre, and is typically diplomatic, business, or literary.
Prerequisite: Must have completed or be concurrently enrolled in RUSS302.

RUSS406 Russian-English Translation II (3 Credits)
Continuation of RUSS405.
Prerequisite: RUSS405.

RUSS409 Selected Topics in Russian Language Study (3 Credits)
Presentation of a topic in Russian language study.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

RUSS411 Linguistic Analysis of Russian I (3 Credits)
Elucidation of theoretical concepts of modern linguistics through the analysis of problematic concepts in the Russian linguistic system. Phonology and the syntax of the simple sentence.
Prerequisite: Must have completed or be concurrently enrolled in RUSS301.

RUSS412 Linguistic Analysis of Russian II (3 Credits)
Continuation of RUSS411. The syntax of the complete sentence, semantics.
Prerequisite: RUSS411.

RUSS433 Russian Literature of the 20th Century (3 Credits)

RUSS439 Selected Topics in Russian Literature (3 Credits)
Presentation of a topic in Russian literature.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

RUSS499 Independent Study in Russian (1-3 Credits)
Independent study under faculty supervision.
Prerequisite: Permission of instructor.
Repeatable to: 6 credits if content differs.

RUSS618 Special Topics in Linguistic Analysis of Russian (3 Credits)
Aspects of Russian linguistics such as stress, verbal, tense, taste, word order, or problems in lexical semantics.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

RUSS619 Seminar in Linguistic Analysis of Russian (3 Credits)
Current research in Russian linguistic analysis.
Prerequisite: RUSS610; and (RUSS612, RUSS611, or RUSS613).
Repeatable to: 6 credits if content differs.

RUSS673 History of the Russian Language (3 Credits)
Introduction to historical Russian grammar and phonological developments in Russian.
Prerequisite: SLAV475.

RUSS679 Special Topics in Slavic Linguistics (3 Credits)
Topics concerning contrastive, historical, and dialectical Slavic linguistics, in relation to our understanding of grammatical theory.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

RUSS798 Independent Study (1-3 Credits)

RUSS799 Thesis Research (1-6 Credits)

SLAA - Second Language Acquisition and Application

SLAA410 Second Language Acquisition: Theory, Research, and Practice (3 Credits)
Introduces vibrant and expanding branch of language science and cognitive science: theory, research and practice in SLA. Students apply what they learn to practical issues ranging from learning languages as an adult to societal problems involving second languages and dialects.
Prerequisite: LING200, LING240, PSYC200, PSYC221, or PSYC354.

SLAA498 Second Language Research and Practicum (1-3 Credits)
Individualized research and practicum for undergraduate students to work as Undergraduate Research Assistants (UGRA) on existing projects under the supervision of a PhD Graduate Supervisor (GS) in the area of second language acquisition to learn/experience how second language as well as psycholinguistic research is conducted.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 9 credits if content differs.
Additional Information: UGRAs register for 1-3 credits. A specific weekly schedule will be determined at the beginning of the semester. Throughout the semester, students will meet with the Graduate Supervisor (GS) once per week to discuss the theoretical and methodological background of the project as well as the broader area behind the research. In addition to the training in theoretical background, the first several weeks of the semester will be devoted to hands-on details of running subjects using a particular method and analyzing data. When this training is complete, UGRAs will work more independently to schedule and run research projects and process the data.

SLAA610 Research and Theories in Second Language Acquisition (3 Credits)
Introduction to current theories and research findings Second Language Acquisition (SLA).

SLAA611 Fundamentals of Foreign Language Acquisition and Instruction (3 Credits)
Introduction to theoretical and practical issues relevant to foreign language learning, language acquisition, and curriculum construction.

SLAA620 Second Language Research Methodologies (3 Credits)
An exploration of research methodology in second language acquisition (SLA), with a focus on developing practical skills in data analysis and interpretation. Preparation in both critical evaluation of existing research and design of new research models.
Prerequisite: SLAA610; and must have completed or be concurrently enrolled in SLAA611.

SLAA629 Special Topics in Sociolinguistics (3 Credits)
Current topics in research in sociolinguistics.
Repeatable to: 9 credits if content differs.

SLAA630 Second Language Testing (3 Credits)
An introduction to basic concepts in the assessment of second language knowledge. Issues of reliability, dependability, construct validity, utility, and washback on instruction are examined.
Prerequisite: SLAA610; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SLAA639 Special Topics in Applied Linguistics (3 Credits)
Current topics in research in applied linguistics.
Repeatable to: 9 credits if content differs.

SLAA640 Psycholinguistics (3 Credits)
An introduction to the field of psycholinguistics that covers speech perception, word recognition, sentence and discourse processing, speech production, and language acquisition. Basic concepts, research methods, major research topics, leading theories and related research findings, with implications of psycholinguistic theories and findings for second language studies.
Prerequisite: SLAA610; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SLAA649 Special Topics in Second Language Acquisition (3 Credits)
Current topics in research in second language acquisition.
Repeatable to: 9 credits if content differs.

SLAA650 Second Language Analysis (3 Credits)
An overview of the field of linguistics with a particular attention to its application in SLA studies, introduces students to the basic concepts and skills related to the scientific study of language, and provides them with opportunities to apply these concepts and skills in the analysis of language. It covers topics such as phonetics, phonology, morphology, syntax, semantics, language acquisition, and language use.
Prerequisite: SLAA610; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SLAA719 Second Language Acquisition and Application Internship (3 Credits)
Internship at a site to be determined. Topics may include heritage language learning, immersion education, testing and assessment, translation and interpretation, and national language planning and policy.
Repeatable to: 6 credits if content differs.

SLAA740 Research Issues in Second Language Learning (3 Credits)
Current topics in second language learning research including interlanguage development, negative feedback, maturational constraints, units of acquisition, stabilization/fossilization, aptitude and aptitude training.
Credit Only Granted for: SLAA649L or SLAA740.

SLAA741 Cognitive Processes in Second Language Learning (3 Credits)
Examines the roles played by varied types of learning processes and memory, general processing issues, and the cognitive bases of individual differences in learning and processing a second language.
Prerequisite: SLAA610; or students who have taken courses with comparable content may contact the department.

SLAA742 Second Language Processing (3 Credits)
Covers leading theoretical approaches and experimental methods in second language processing. Draws on research and theories in Second Language Acquisition (SLA), formal linguistics, cognitive grammar, psycholinguistics, and neurolinguistics.
Restriction: Permission of instructor required for MA students.

SLAA744 Age Effects in Second Language Learning (3 Credits)
Consideration of the empirical evidence for age effects in second language learning and its potential confounds. Critical evaluation of the differing interpretations of these effects and their implications for educational practice, SLA theory, development psychology, and research methodology.
Prerequisite: SLAA610.
Restriction: Permission of instructor.
Credit Only Granted for: SLAA649M or SLAA744.
Formerly: SLAA649M.

SLAA749 Special Topics in Second Language Learning (3 Credits)
Current topics in research on Second Language Learning.
Prerequisite: SLAA610; or permission of instructor.

SLAA750 Instructed Second Language Acquisition (3 Credits)
Survey of studies on effectiveness of SLA instruction within various domains of language, with focus on research design.
Prerequisite: SLAA610.

SLAA754 Task-Based Language Teaching (3 Credits)
Overview of Task-Based Language Teaching (TBLT) including needs and means analysis, syllabus design, materials writing, methodology and pedagogy, testing, and evaluation. Theoretical issues addressed include relationship of TBLT to research findings on the psychology of learning and SLA and libertarian approaches to education.
Credit Only Granted for: SLAA649T or SLAA754.
Formerly: SLAA649T.

SLAA759 Special Topics in Second Language Instruction (3 Credits)
Topics in the theory and practice of second language instruction.
Prerequisite: Permission of ARHU-College of Arts & Humanities.
Repeatable to: 12 credits.

SLAA760 Fundamentals of Second Language Assessment (3 Credits)
An overview of current assessment models in foreign and second language learning.
Prerequisite: SLAA610.

SLAA772 Bilingualism and Multilingualism (3 Credits)
Critical exploration of concepts in bilingualism and multilingualism with emphasis on the social environments of second language acquisition, through the lens of cognitive and social frameworks. Implications of bilingualism for memory, affect, language processing and code-switching/mixing, as well as the social implications of knowing and using more than one language.
Prerequisite: SLAA610; or permission of instructor.

SLAA773 The Heritage Language Speaker (3 Credits)
Critical exploration of the theoretical issues and existing experimental research on heritage language learning and use as well as consideration of classroom and curricular implications of heritage language learning.
Restriction: Permission of instructor required for Master students.

SLAA779 Directed Research in Second Language Acquisition and Application (1-3 Credits)
Directed independent research in Second Language Acquisition or Application. In this capstone project, students engage in independent research under faculty direction.
Repeatable to: 3 credits if content differs.

SLAA798 Master's Independent Study (1-3 Credits)

SLAA799 Master's Thesis Research (1-6 Credits)

SLAA888 Doctoral Independent Study (1-3 Credits)
Individual instruction course.
Prerequisite: Permission of ARHU-College of Arts & Humanities.
Repeatable to: 9 credits if content differs.

SLAA898 Pre-Candidacy Research (1-8 Credits)

SLAA899 Doctoral Dissertation Research (1-8 Credits)

SLAV - Slavic

SLAV469 Selected Topics in Slavic Studies (3 Credits)
Presentation of a topic in Slavic studies.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

SLAV475 Old Church Slavonic (3 Credits)
Introduction to the language of the oldest recorded Slavic documents. Historical presentation of phonology, morphology, and syntax; reading of texts.

SLAV479 Selected Topics in Slavic Linguistics (3 Credits)
Presentation of a topic in Slavic linguistics.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

SLAV499 Directed Study (1-3 Credits)

SLLC - School of Languages, Literatures and Cultures

SLLC400 Articulatory Phonetics for Second Language Acquisition and Application (3 Credits)
The mechanical capabilities of the human vocal apparatus for producing speech sounds, and their terminology and transcription in the International Phonetic Alphabet. Emphasis is on the practical needs of the teacher and student of foreign language, rather than the theoretical linguist or the hearing-and-speech pathologist. The phonetics of major languages are also introduced, with attention to the pedagogy of their phonetics.
Restriction: Junior standing or higher.
Credit Only Granted for: SLLC400.

SLLC410 Documentary and Narrative (3 Credits)
An examination of the relationship between film and reality, focusing on documentary film.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of ARHU-School of Languages, Literatures, and Cultures department. Also offered as: FILM410.
Credit Only Granted for: SLLC410 or FILM410.

SLLC411 Experimental Film (3 Credits)
Introductory survey of European and U.S. American experimental cinema.Also offered as: FILM411.
Credit Only Granted for: SLLC411 or FILM411.

SLLC461 Political Cinema (3 Credits)
Histories of cinema and politics in the 20th century.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of ARHU-School of Languages, Literatures, and Cultures department. Also offered as: FILM461.
Credit Only Granted for: SLLC461, FILM461, CMLT498P, or SLLC468P.
Formerly: CMLT498P or SLLC468P.

SLLC463 Screening Time: History and Memory in Cinema (3 Credits)
An examination of the ways and techniques with which cinema produces a sense of time in the viewer.
Prerequisite: ENGL245, FILM245, SLLC283, or FILM283; or permission of ARHU-School of Languages, Literatures, and Cultures department. Also offered as: FILM463.
Credit Only Granted for: SLLC463 or FILM463.

SLLC468 Special Topics in Film Studies II (3 Credits)
Exploration of topics in film studies beyond national traditions, for example through the lens of theory, genre, auteurship, aesthetic movements in cinema, and/or comparative perspectives. Courses at the 400-level have higher expectations of independent work, including reading and written assignments.
Repeatable to: 12 credits if content differs.

SLLC471 The Cultural Environment of Global Business (3 Credits)
The goal of this course is to provide students with an understanding of cultural aspects pertaining to global business, and thereby increasing their awareness of the cultural factors that motivate decisions and behavior in the business world. Students will gain an understanding of how the business cultures in the rest of the world diverge from the American, and develop the cultural understanding, attitudes, and communication skills needed to function appropriately within an increasingly global and multicultural working environment.
Restriction: Sophomore standing or higher.
Credit Only Granted for: ARHU439B, ARHU439E, ARHU439T, ENES472, SLLC471, SLLC472, or SLLC473.
Formerly: ARHU439B.

SLLC472 International Business Cultures in Engineering and Technology (3 Credits)
The goal of this course is to provide students with an understanding of cultural aspects pertaining to global business and engineering, and thereby increasing their awareness of the cultural factors that motivate decisions and behavior in the business world. Students will gain an understanding of how the business cultures in the rest of the world diverge from the American, and develop the cultural understanding, attitudes, and communication skills needed to function appropriately within an increasingly global and multicultural working environment.
Restriction: Sophomore standing or higher. Also offered as: ENES472.
Credit Only Granted for: ARHU439B, ARHU439E, ARHU439T, ENES472, SLLC471, SLLC472, or SLLC473.
Formerly: ARHU439T.

SLLC473 European Business Cultures (3 Credits)
The goal of this course is to provide students with an understanding of cultural aspects pertaining to European business, and thereby increasing their awareness of the cultural factors that motivate decisions and behavior in the European business world. Students will gain an understanding of how the European business cultures diverge from the American, and develop the cultural understanding, attitudes, and communication skills needed to function appropriately within an increasingly global and multicultural working environment.
Restriction: Sophomore standing or higher.
Credit Only Granted for: ARHU439B, ARHU439E, ARHU439T, ENES472, SLLC471, SLLC472, or SLLC473.
Formerly: ARHU439E.

SLLC499 Special Topics in World Cultures (3 Credits)
Interdisciplinary, transnational or cross-language course; specific topic to be announced.
Repeatable to: 12 credits if content differs.

SLLC601 Teaching Foreign Languages in Higher Education (1 Credit)
Methods and materials for teaching foreign languages in higher education.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Credit Only Granted for: SLLC601 or SPAN605.
Formerly: SPAN605.

SLLC698 Special Topics in Interdisciplinary Studies (1-3 Credits)
Cross-departmental or cross-programmatic study within the School of Languages, Literatures, and Cultures. Topic to be announced when course is offered.

SLLC789 Master's Independent Study (1-3 Credits)

SLLC878 Pedagogical Mentoring for Doctoral Students (1 Credit)
Pedagogical mentoring by faculty members for doctoral students who have completed their first semester of TA training.
Prerequisite: SLLC601; and permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 8 credits if content differs.

SLLC889 Doctoral Independent Study (1-3 Credits)

SOCY - Sociology

SOCY401 Intermediate Statistics for Sociologists (4 Credits)
Issues in the use of significance tests in sociology, one and two-way analysis of variance, elements of multiple regression and correlation, techniques for the analysis of nominal and ordinal data.
Prerequisite: SOCY201; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Sociology department.
Restriction: Must not have completed STAT400, BMGT231, or ENEE324.

SOCY405 Scarcity and Modern Society (3 Credits)
Resource depletion and the deterioration of the environment. Relationship to lifestyles, individual consumer choices, cultural values, and institutional failures. Projection of the future course of American society on the basis of the analysis of scarcity, theories of social change, current trends, social movements, government actions, and the futurist literature.
Prerequisite: 6 credits in SOCY courses.
Credit Only Granted for: SOCY305 or SOCY405.
Formerly: SOCY305.

SOCY406 Globalization (3 Credits)
An analysis of the forces driving globalization and its implications for THE SOCIAL WORLD; politics; culture (including American popular culture); technology; the media; the Internet; population flows; environmental changes and problems; other negative (or deviant) flows such as disease, crime and terrorism; inequality, as well as ways of dealing with or resisting globalization (alter-globalization).
Prerequisite: 6 credits in SOCY courses.
Credit Only Granted for: SOCY406 or SOCY498G.
Formerly: SOCY498G.

SOCY407 Explaining Social Change: Historical and Comparative Methods (3 Credits)
Examines social change from the perspective of comparative and historical sociology to get at the question, 'where are we now?' Students develop a critical appreciation of how scholars construct persuasive explanations for large-scale change focusing on four central questions: the origins of markets and industrial capitalism; the emergence of democracy as opposed to dictatorship; the causes and consequences of social revolution; and the logic of armed conflict. Explanations offered for the changes in question as well as the methods employed are explored. Counterfactual hypotheticals for each central question--that is, what might have been, rather than what historically emerged--are considered.
Prerequisite: 6 credits in SOCY courses.
Credit Only Granted for: SOCY407 or SOCY498Y.
Formerly: SOCY498Y.

SOCY410 Social Demography (3 Credits)
Types of demographic analysis; demographic data; population characteristics; migration; mortality; fertility; population theories; world population growth; population policy.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY411 Demographic Techniques (3 Credits)
Basic techniques for analyzing population structure and demographic processes, including fertility, mortality and migration.
Prerequisite: (SOCY201; or students who have taken courses with comparable content may contact the department); and SOCY410. Or permission of BSOS-Sociology department.

SOCY412 Family Demography (3 Credits)
Family and population dynamics. Fertility issues, such as teenage pregnancy, the timing of parenthood, and family size; as they relate to family behavior, such as marital patterns, child care use, and work and the family. Policy issues that relate to demographic changes in the family.
Prerequisite: 6 credits in SOCY courses.
Formerly: SOCY312.

SOCY413 Sociology of Aging (3 Credits)
The aging of the population is one of the major demographic changes affecting social institutions during the next century. Research demography, sociology, economics, epidemiology, psychology and public health are integrated to develop a broader understanding of the causes and consequences of population aging. A central focus is the diversity of experiences by age, gender, socioeconomic status and health.
Prerequisite: 2 courses in SOCY.
Credit Only Granted for: SOCY498D or SOCY413.
Formerly: SOCY498D.

SOCY415 Environmental Sociology (3 Credits)
Overview of the field and theoretical themes within the area of environmental sociology and technology. Current issues are explored including: environmental attitudes; environmental movements; environmental justice; globalization; global climate change; and garbage and food.
Prerequisite: 6 credits in SOCY courses.
Credit Only Granted for: SOCY498E or SOCY415.
Formerly: SOCY498E.

SOCY418 Research in Family & Demography (3 Credits)
This is a special topics research course for Family and Demography.
Prerequisite: SOCY202 and SOCY203; and one course in Family and Demography.
Repeatable to: 6 credits if content differs.

SOCY420 Qualitative Research Methods in Sociology (3 Credits)
Using the sociological imagination to independently explore research questions as designed by students. Readings will explore dilemmas qualitative researchers confront such as, how to conduct research ethically and how their background influences their findings and analysis. Students will learn how to collect data, analyze it, and present it to others.
Prerequisite: 6 credits in SOCY courses.

SOCY424 Sociology of Race Relations (3 Credits)
Analysis of race-related issues, with a primary focus on American society. The historical emergence, development, and institutionalization of racism; the impact of racism on its victims; and racially based conflict.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department. Also offered as: AAST424.
Credit Only Granted for: AAST424 or SOCY424.

SOCY428 Research in Inequality (3 Credits)
This is the special topics research course for Stratification and Inequality.
Prerequisite: SOCY203 and SOCY202; and must have completed a course in Stratification and Inequality.
Repeatable to: 6 credits if content differs.

SOCY430 Social Structure and Identity (3 Credits)
Theoretical issues in social psychology, focusing on social construction of identity. Identity formation and transformation in social process. Structural and cultural dimensions of social identity.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY431 Principles of Organizations (3 Credits)
Structural and processual characteristics of organizations that make them effective for different purposes and in different environments. Effects of different institutional environments, small group processes, organizational networks, and leadership. Types of organizations studied include formal bureaucracies, professional organizations, and voluntary associations.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY432 Social Movements (3 Credits)
Movements that seek change in the social and political structure of society. Origins, tactics, organization, recruitment, and success. Case studies come from such movements as labor, civil rights, student, feminist, environmental, neighborhood, and gay rights.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY441 Social Stratification and Inequality (3 Credits)
The sociological study of social class, status, and power. Topics include theories of stratification, correlates of social position, functions and dysfunctions of social inequality, status inconsistency, and social mobility.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.
Restriction: Junior standing or higher.

SOCY443 The Family and Society (3 Credits)
Study of the family as a social institution; its biological and cultural foundations, historical development, changing structures and functions, the interaction of marriage and parenthood, disorganizing and reorganizing factors in present-day trends.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY444 Sociology of Children (3 Credits)
Socio-historical analysis of the changing nature and meaning of childhood. Analysis of social psychological, demographic, and socioeconomic aspects of contemporary children's lives, with a focus on peer groups, gender relations, family change, macroeconomic conditions, poverty, health, and educational well-being of children.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY445 Sex and Love in Modern Society (3 Credits)
Sociological theories of sex and gender are used to explore empirical research on women's and men's sexual behavior and attitudes; variation in gendered sexuality by key social characteristics and how gendered sexuality is constructed and controlled; changes in sexuality over time and across relationship types, focusing on changes in sexual desire and behaviors and on the changing meaning of sex and marriage in U.S. society and other countries. Contemporary debates about sexuality will also be examined.
Prerequisite: SOCY201, SOCY202, SOCY203, and SOCY230.
Restriction: Must be in Sociology program; or permission of BSOS-Sociology department.
Credit Only Granted for: SOCY498X or SOCY445.
Formerly: SOCY498X.

SOCY457 Sociology of Law (3 Credits)
Social, political, and cultural sources of legal norms and concepts; and how the law shapes society and society shapes the law using sociological theoretical frameworks. The role of social change, social reproduction and inequality (including race, class, gender, and sexuality) to achieve certain objectives such as compliance, deterrence and social control.

SOCY464 Military Sociology (3 Credits)
Social change and the growth of military institutions. Complex formal military organizations. Military service as an occupation or profession. The sociology of military life. Relations between military institutions, civilian communities and society.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY465 The Sociology of War (3 Credits)
The origin and development of armed forces as institutions, the social causes, operations and results of war as social conflict; the relations of peace and war and revolution in contemporary civilizations.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY467 Sociology of Education (3 Credits)
Sociological analysis of educational institutions and their relation to society: goals and functions, the mechanisms of social control, and the impacts of stratification and social change. Study of the school as a formal organization, and the roles and subcultures of teachers and students.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY480 Researching the Middle East (3 Credits)
Introduces religion, gender, and politics in the Middle East and North Africa. After an overview of the political and social history the focus will be on methods for carrying out fundamental issues facing Middle Eastern societies, including national identity, religion, gender relations and the status of women in the family, politics, education, and labor market.
Prerequisite: Minimum grade of C- in SOCY201, SOCY202, and SOCY203.
Credit Only Granted for: SOCY498E or SOCY480.
Formerly: SOCY498E.

SOCY498 Selected Topics in Sociology (1-3 Credits)
Topics of special interest to advanced undergraduates in sociology. Such courses will be offered in response to student request and faculty interest.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.
Repeatable to: 6 credits.

SOCY601 Statistics For Sociological Research I (3 Credits)
Introductory statistical concepts are covered including descriptive statistics, probability, sampling distributions, expected values, hypothesis testing, tests of significance, measures of association, and if time permits, introduction to regression analysis. Statistical programming software may be used.
Prerequisite: SOCY201; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.
Credit Only Granted for: SOCY601 and SURV601.

SOCY602 Statistics For Sociological Research II (3 Credits)
This course introduces regression analysis using matrix algebra. Topics include bivariate regression, multivariate regression, tests of significance, regression diagnostics, indicator variables, interaction terms, extra sum of squares, and the general linear model. Other topics may be addressed such as logistic regression and path analysis. Statistical programming software may be used.
Prerequisite: SOCY601; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.
Credit Only Granted for: SOCY602 or SURV602.

SOCY609 Practicum in Social Research (3 Credits)
The conduct of research in collection and analysis of social science data under the guidance of experienced investigators. Emphasis on a particular research area of procedure, e.g. secondary analysis of survey data; experimental design; evaluation of research; data collection techniques.
Restriction: Permission of instructor.

SOCY611 Introduction to Demographic Methods (3 Credits)
Survey of standard demographic methods for the description and analysis of population size, structure and composition, including techniques for the analysis of fertility, mortality and migration.

SOCY616 Sociology Pro-Seminar (1 Credit)
The proseminar is the guide to Sociology as a profession, and how sociology is practiced here at the University of Maryland. The goal of the course is to help students gain insider knowledge about how to develop sociological knowledge and capabilities, and what it means to practice sociology as a graduate student and beyond. The course will discuss both practical aspects of professional life in general and specific topics of interest.
Restriction: Must be in Sociology (Doctoral) program.
Credit Only Granted for: SOCCY699P or SOCY616.
Formerly: SOCY699P.

SOCY618 Computer Methods for Sociologists (3 Credits)
Designed to present the potential of the computer as a tool in sociological research. Projects involving programming and running of data manipulation techniques, statistical techniques, and simple simulations.
Prerequisite: SOCY401; or students who have taken courses with comparable content may contact the department. And must have elementary knowledge of a programming language; or CMSC120; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.

SOCY620 Development of European and American Sociological Theory (3 Credits)
Review of the history of sociological thought with major attention to the key figures (from Marx to C. Wright Mills).
Prerequisite: SOCY203 or SOCY403; or students who have taken courses with comparable content may contact the department; or permission of instructor.

SOCY621 Contemporary Sociological Theory (3 Credits)
Review of sociological theory since approximately 1970, with emphasis given to schools of thought (from symbolic interaction to post-modernism) and priciple participants in them (from Goffman to Baudrilliard).
Prerequisite: SOCY620, SOCY203, or SOCY403; or permission of instructor.

SOCY622 The Sociology of Knowledge (3 Credits)
Analysis of the relation of types of knowledge to social structure. Role of social class and social organization in the development of science, political ideology, belief systems and social values. Social roles associated with production of knowledge.

SOCY623 Families and Modern Social Theory (3 Credits)
Modern families will be explored by combining core theories of modernity with key theoretical debates about families and intimate relationships (economics and economic sociology, gender, race), and social change (development and new family forms).
Restriction: Must be in one of the following programs (Sociology (Doctoral); Sociology (Master's)) ; or permission of instructor.

SOCY625 Activism and Global Movements (3 Credits)
An introduction to the research on activism, focusing particularly on the global and transnational aspects of activism and social movements. The course begins with an overview of the theoretical literature on activism and social movements. Then, we will focus on case studies of particular movements that have a global component and have been the focus of recent sociological inquiry: the globalization movement, Arab Spring, and the climate/climate justice movement.
Restriction: Must be enrolled in a Sociology (SOCY) graduate program; or permission of instructor.

SOCY626 Demography of Aging (3 Credits)
Examines the demographic foundations of population aging, focusing on macro and historical patterns as well as on trends in mortality health and disability. Also examines the relationship between aging and social institutions such as the family, the economy and public policy.

SOCY627 Migration (3 Credits)
Examines theories of immigration and immigrant adaptation, empirical patterns of migration and immigration, the economic and social effects of immigration, as well as immigration policy issues.

SOCY630 Population and Society (3 Credits)
Selected problems in the field of population; quantitative and qualitative aspects; American and world problems.

SOCY633 Qualitative Research Methods II, Field Research (3 Credits)
As the second course in the qualitative methods sequence, students are expected to have a general knowledge of qualitative methods. Students should have already learned how to collect and analyze qualitative data using interview and ethnographic methods. Student will spend this semester collecting and analyzing qualitative data and must begin the course with a formulated research question, a plan for data collection and sampling. Each student will spend the first two weeks preparing a proposal for submission the the University of Maryland's Institutional Review Board to gain Human Subjects approval to collect data. Then, students will spend a month collecting data, a month analyzing data using QSR NVivo, which will be taught as part of the coursework, and writing up the findings. The end product of the course will be an empirical paper based on the data collected and analyzed throughout the semester.
Prerequisite: SOCY632; or students who have taken courses with comparable content may contact the department.

SOCY634 Attitudes and Public Opinion (3 Credits)
Processes involved in the formation of attitudes; effects of communication; measurement techniques.

SOCY635 Social Aspects of Fertility (3 Credits)
Demographic and socioeconomic aspects of fertility behavior; causes and consequences of fertilty decline; relationship between women's status and fertility; determinants of adolescent and nonmarital fertility; differential fertility by race/ethnicity and migration status.
Restriction: Permission of instructor.

SOCY637 Demography Of The Labor Force (3 Credits)
Demographic trends as related to the composition of the U.S. labor force and trends in income; employment status of immigrants, women, and minorities; relationship between skills and jobs; types of data available for study of the labor force.
Restriction: Permission of instructor.

SOCY642 The Sociology of Mental Health (3 Credits)
Social factors that influence mental health. Group dynamics of mental health preservation.

SOCY644 Gender, Work, and Family (3 Credits)
The interrelationships among gender, work, and family in contemporary societies. Major research issues addressed from an interdisciplinary and comparative (international) perspective.

SOCY645 Sociology of the Self Concept (3 Credits)
Theory and empirical research dealing with the social determination and social consequences of the self-concept. Sociological, psychological, and psychoanalytic approaches to the self.

SOCY653 Family Demography (3 Credits)
Demograpic perspective on family and household relationships; relationships among economic institutions, family structure, and the content of family life; research from contemporary U.S., historical and cross-cultural sources.
Restriction: Permission of instructor.

SOCY660 Theories of Social Psychology (3 Credits)
An introduction to some of the theories in social psychology that are particularly useful to sociologists. Topics to be covered include theories of cognitive consistency, social exchange, symbolic interaction, role theory, group processes, and collective behavior.
Prerequisite: Must have completed an undergraduate training in sociological research methods, statistics, and theory; or students who have taken courses with comparable content may contact the department.

SOCY661 Social Stratification (3 Credits)
Major theoretical and research problems in the sociology of social stratification. The characteristics, correlates, and consequences of class and status stratification; the distribution of power; the relationship of social stratification to ideology and the institutional orders of society.
Restriction: Permission of instructor.

SOCY664 Armed Forces and Society (3 Credits)
Analysis of the relationship between military organization and modern industrial society. Growth and decline of the mass army, the transition from conscription to all-volunteer forces, the social legitimacy of military organization, the military as a form of industrial organization, and problems of civil-military relations in the modern world.

SOCY671 Sociology of Development (3 Credits)
Third World development at institutional, organizational, and community levels; factors contributing to success, effectiveness and sustainability of development and to problems and hindrances.
Restriction: Permission of instructor.

SOCY699 Special Social Problems (1-16 Credits)

SOCY701 Issues in the Integration of Theory and Method (3 Credits)
The course is intended solely for advanced doctoral sociology students. The main objective of the course is to develop a dissertation proposal. Consequently, this course may only be taken during or after the semester in which the student completes the specialty (comprehensive) exams.
Prerequisite: Must have attained advanced status in the sociology Ph.D. program; or permission of instructor.
Credit Only Granted for: SOCY699Y or SOCY701.
Formerly: SOCY699Y.

SOCY709 Advanced Special Topics in Data Analysis (3 Credits)
An intensive examination of an area of interest in data analysis, including such topics as log linear analysis; discriminant function analysis; canonical correlation; factor analysis; analysis of qualitative data; content analysis; mathematical models.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY719 Advanced Special Topics in Social Psychology (3 Credits)
An intensive review of an area of current interest in the field, including such topics as social influence; interpersonal attraction; equity theory; the dramaturgical perspective; stress and coping; interpersonal conflict; the social psychology of large organizations.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY728 Advanced Special Topics in Meta-theory (3 Credits)
An intensive examination of an area of interest in sociological theory, including such topics as paradigm conflicts; philosophy of social science; value issues in sociological theory; formal theory.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY729 Advanced Special Topics in Substantive Theory (3 Credits)
An intensive examination of an area of interest in theory or a school of sociological theory, including such topics as ethnomethodology; structuralism; Marxism and critical theory; historical study of a major sociological theorist such as Marx, Weber, or Durkheim.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY739 Advanced Special Topics in Organizations and Occupations (3 Credits)
An intensive review of an area of current interest in the field, including such topics as managing organizational data sets; problems of industrial democracy; quality of work life; innovation and productivity.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY749 Advanced Special Topics in Demography (3 Credits)
An intensive review of an area of current interest in the field, including such topics as population policy; social and demographic issues in aging; migration; family demography.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY758 Advanced Special Topics in Sex Roles (3 Credits)
An intensive review of an area of current interest in the field, including such topics as labor force participation; comparative studies; sex roles and aging; gender socialization.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY759 Advanced Special Topics in Sociology of the Family (3 Credits)
An intensive review of an area of current interest in the field, such as alternative family life styles, cross-cultural and comparative family studies; victimization (sexual and physical abuse).
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY769 Advanced Special Topics in Military Sociology (3 Credits)
An intensive review of an area of current interest in the field, including such topics as women in the military; conscription and national service; organizational change in the military; comparative studies of the military.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY789 Advanced Special Topics in Social Stratification (3 Credits)
An intensive examination of an area of interest in the field, including such topics as macrostratification; measurement of prestige; institutional variation in status attainment.
Restriction: Permission of instructor.

SOCY799 Master's Thesis Research (1-6 Credits)

SOCY819 Research Seminar in Social Psychology (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in social psychology.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY829 Research Seminar in Sociological Theory (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in sociological theory.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY839 Research Seminar in Organizations and Occupations (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in organizations or occupations.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY849 Research Seminar in Demography (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in demography.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY858 Research Seminar in Gender, Work and Family (1 Credit)
An advanced research seminar for students preparing to do research or take the specialty examination in Gender, Work and Family.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY859 Research Seminar in Sociology of the Family (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in sociology of the family.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY869 Research Seminar in Military Sociology (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in military sociology.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY889 Research Seminar in Social Stratification (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in stratification.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY898 Pre-Candidacy Research (1-8 Credits)

SOCY899 Doctoral Dissertation Research (1-8 Credits)

SPAN - Spanish

SPAN401 Advanced Composition I (3 Credits)
Compositions and essays with emphasis on stylistics, idiomatic and syntactic structures. Organization and writing of research papers.
Prerequisite: SPAN302; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SPAN402 Advanced Composition II (3 Credits)
Compositions and essays with emphasis on stylistics, idiomatic and syntactic structures. Organization and writing of research papers.
Prerequisite: SPAN401; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SPAN406 Don Juan Manuel's Fictional and Historical Prose (3 Credits)
Dedicated to the literary production of an important author. Don Juan Manuel. By examining the interaction among writing, reading and the oral acquisition of knowledge in his works, special attention will be given to how the border between fact and fiction is constructed in the Middle Ages.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN408 Great Themes of the Hispanic Literatures (3 Credits)
Major themes in the literature of Spain or Spanish-America. Each theme will be announced when the course is offered.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN413 Libro de Buen Amor (3 Credits)
Literary traditions in the Libro de buen amor.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN417 Practicum in Translation VI (3 Credits)
Translation of complete literary texts from Spanish into English. Evaluation of different versions of the original. Problems of interpretation, literary structure and analysis.
Prerequisite: SPAN416; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SPAN418 Hispanic Literature in Translation (3 Credits)

SPAN422 Intercultural Communication and Negotiation (3 Credits)
Focuses on the relationship of language and culture of those operating in world markets. Particular attention will be given to intercultural communication, linguistic systems, culture specific perceptions of, and negotiation with, the Spanish-speaking world. Taught in Spanish.
Prerequisite: SPAN370 OR SPAN371 OR SPAN373 OR SPAN 374.
Restriction: Junior standing or higher.

SPAN425 Hispanic Linguistics II: Structures of Spanish (3 Credits)
This course begins with an introduction to general concepts in linguistics, from language function and the brain to communication, culture, and thought, and their relation to other disciplines in the social sciences. The main purpose of this course is to provide an overview of Hispanic linguistics through multiple perspectives, while exploring the areas of Spanish morphology, syntax, and semantics. This course will also focus on the structural tendencies of Spanish through a variety of practical activities. Taught in Spanish.
Prerequisite: SPAN303; and SPAN311 or SPAN316 or SPAN325.

SPAN426 Hispanic Linguistics III: Language in Use (3 Credits)
Designed for students without previous experience in Linguistics. Focus on language variation and use, linguistic change, and bilingualism. Taught in Spanish.
Prerequisite: SPAN303; and SPAN311 or SPAN316 or SPAN325. Also offered as: SPAN626.
Credit Only Granted for: SPAN426 or SPAN626.

SPAN427 Visions and Fictions from Spain (3 Credits)
Overview of Spanish Cinema from the end of the 19th century through present day Spain. Exploration of the production of literary and cinematic texts in their sociohistorical, political, religious and cultural contexts. Taught in Spanish.
Prerequisite: SPAN331, SPAN332, or SPAN333; or students who have taken courses with comparable content may contact the department; or permission of ARHU-Spanish & Portuguese Languages & Literatures department. Also offered as: FILM427.
Credit Only Granted for: FILM427 or SPAN427.

SPAN430 Cervantes: Don Quijote (3 Credits)

SPAN432 Colonial Latin American Literature (3 Credits)
Examines the key themes, writers, literary movements, and cultural debates of the colonial period.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN433 Women and Culture in Colonial Latin America (3 Credits)
Considers questions of women and historical production, women writers in colonial times, and contemporary literary interpretations of colonial realities. Debates the continued legacy of female archetypes from the colonial period to the present, and epistemological questions regarding the production of knowledge.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN438 Special Topics in Colonial Latin America (3 Credits)
The conquest and colonization of the New World produced a textual corpus of invaluable importance for the foundation of Spanish American literary tradition. Special topics (themes, authors, debates, etc.) relevant to the Colonial period will be addressed.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 9 credits if content differs.

SPAN448 Special Topics in Latin American Civilization (3 Credits)
Intensive independent study of a selected topic related to Latin American civilization.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 6 credits if content differs.

SPAN449 Special Topics in Spanish Civilization (3 Credits)
An intensive study of a selected topic related to Spanish civilization.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 6 credits if content differs.

SPAN450 The Hispanic Caribbean (3 Credits)
Explores the Hispanic Caribbean as "island spaces" of multiple migrations and cultural identities, as sites of colonial experiences and post-colonial debates.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Credit Only Granted for: SPAN408C or SPAN450.
Formerly: SPAN408C.

SPAN459 Latin American Women Writers (3 Credits)
Emphasis will be placed on contemporary Latin American women writers.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 9 credits if content differs.

SPAN460 The Sublime and the Grotesque in Spanish Romantic Plays and the Visual Arts (3 Credits)
An exploration of the notions of the sublime and the grotesque in theatrical works as well as in the visual arts of the Romantic movement in Spain. Taught in Spanish.
Prerequisite: SPAN331, SPAN332, SPAN333, SPAN361, SPAN362, or SPAN363; or permission of instructor.
Credit Only Granted for: SPAN408V OR SPAN460.
Formerly: SPAN408V.

SPAN462 Twentieth Century Drama (3 Credits)
Significant plays of the twentieth century.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN463 Latin American Drama (3 Credits)
Emphasis will be placed on Latin American plays of the twentieth century.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN464 Contemporary Spanish Poetry (3 Credits)
Spanish poetry from the generation of 1927 to the present.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN466 The Contemporary Spanish Novel (3 Credits)
The novel and the short story from 1940 to the present.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN468 Modernism and Post-Modernism in Spain and Spanish-America (3 Credits)
A study of the most important works and authors of both movements in Spain and Spanish-America.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 9 credits if content differs.

SPAN469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

SPAN470 Spanish for Business II (3 Credits)
Business Spanish terminology, vocabulary and practices. Emphasis on everyday spoken and written Spanish. Readings and discussions of international topics. Cross-cultural considerations relative to international business operations, including exporting and banking. Taught in Spanish.
Prerequisite: Must have completed SPAN370.
Restriction: Sophomore standing or higher.
Credit Only Granted for: SPAN415 or SPAN470.
Formerly: SPAN415.

SPAN471 United States Latina Fiction (3 Credits)
An introduction to United States latina fiction through the study of short stories, novels, poetry, etc. It explores strategies of representation by women of color.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN473 U.S. Latino Performance (3 Credits)
An introduction to United States Latino Performance texts by Chicano, Nuyorican, Cuban-American, Dominican, Central-American and others.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN474 Central American Literatures, Cultures, and Histories (3 Credits)
An overview of Central American history and cultural production, focusing primarily but not exclusively on literary texts.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN478 Special Topics in United States Latino Cultures (3 Credits)
Explores special topics in US Latino Cultures, ranging from Chicano, Nuyorican, Cuban-American, Dominican, Central-American and other border cultural identities.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 9 credits if content differs.

SPAN479 Honors Thesis (3-6 Credits)
Researching and writing an honors thesis under the direction of a professor.
Restriction: Must be in Spanish and Portuguese Honors.
Repeatable to: 6 credits if content differs.

SPAN488 Spanish-American Fiction (3 Credits)
Representative novels and/or short stories from the Wars of Independence to the present or close analysis of major contemporary works. Subject will be announced each time course is offered.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN489 Spanish-American Fiction (3 Credits)
Representative novels and/or short stories from the Wars of Independence to the present or close analysis of major contemporary works. Subject will be announced each time course is offered.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN495 Honors Reading (3 Credits)
Supervised reading.
Prerequisite: Must be in Spanish and Portuguese Honors; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SPAN498 Spanish-American Poetry (3 Credits)
Main trends, authors and works from the conquest to Ruben Dario.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN608 Medieval Spanish Literature (3 Credits)
Specific authors, genres, and literary periods studied in depth.

SPAN609 Medieval Spanish Literature (3 Credits)
Specific authors, genres, and literary periods studied in depth.

SPAN610 The History of the Spanish Language (3 Credits)

SPAN611 Current Trends in Hispanic Applied Linguistics (3 Credits)
Introduction to current trends in Hispanic Applied Linguistics, emphasizing learning and teaching in Spanish-language contexts.
Restriction: Permission of ARHU-Spanish & Portuguese Languages & Literatures department.

SPAN613 Bilingualism and Biculturalism in Spanish-Speaking Communities (3 Credits)
Exploration of Latino bilingual and bicultural communities, Spanglish, language variants, U.S. Latina/o literary and cultural production. Spanish highly recommended.
Restriction: Permission of ARHU-Spanish & Portuguese Languages & Literatures department.

SPAN618 Poetry of the Golden Age (3 Credits)
Analyses and studies in depth of specific works of specific poets in the sixteenth and seventeenth centuries.

SPAN619 Poetry of the Golden Age (3 Credits)
Analyses and studies in depth of specific works of specific poets in the sixteenth and seventeenth centuries.

SPAN625 Introduction to Hispanic Linguistics I:Basic Concepts (3 Credits)
Introduction to basic terms and definition in Hispanic Linguistics. Fundamental aspects of phonology, morphology, syntax, semantics, sociolinguistics, and pragmatics.

SPAN626 Hispanic Linguistics II: Language in Use (3 Credits)
This course will focus on issues related to language variation and use with a more in-depth analysis of the semantics, pragmatics, and sociolinguistics of Spanish. Students will be introduced to current research in the fields of dialectology, bilingualism and language policy, and the social aspects of language change. This course will include an analysis of current research as it relates to the field of linguistics and other social sciences.
Prerequisite: SPAN301; or permission of ARHU-School of Languages, Literatures, and Cultures department. Also offered as: SPAN426.
Credit Only Granted for: SPAN426 or SPAN626.

SPAN628 Seminar: the Golden Age in Spanish Literature (3 Credits)

SPAN629 Seminar: the Golden Age in Spanish Literature (3 Credits)
Specific authors, genres, literary movements and literary periods of the sixteenth and seventeenth centuries studied in depth.

SPAN698 Masterpieces of Hispanic Literatures (3 Credits)
Study of masterpieces of the hispanic literatures, topics, areas of literature and works to vary.
Repeatable to: 6 credits if content differs.

SPAN699 Independent Study in Spanish (1-3 Credits)
This course is designed to provide graduate students an opportunity to pursue independent study under the supervision of a member of the department.
Repeatable to: 3 credits.

SPAN708 The Eighteenth Century (3 Credits)
Specific authors, genres, and literary movements studied in depth.

SPAN718 The Nineteenth Century (3 Credits)
Specific authors, genres, and literary movements studied in depth.

SPAN719 The Nineteenth Century (3 Credits)
Specific authors, genres, and literary movements studied in depth.

SPAN728 The Twentieth Century (3 Credits)
Specific authors, genres and literary movements studied in depth.

SPAN729 The Twentieth Century (3 Credits)
Specific authors, genres and literary movements studied in depth.

SPAN738 The Drama of the Twentieth Century (3 Credits)
Specific authors and movements studied in depth.

SPAN788 Seminar Series in Spanish and Latin American Languages, Literatures, and Cultures (1-2 Credits)
Topics to be announced when course is offered.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 8 credits if content differs.

SPAN798 Open Seminar (3 Credits)

SPAN799 Master's Thesis Research (1-6 Credits)

SPAN808 Colonial Spanish-American Literature (3 Credits)
Didactic and narrative prose and epic, dramatic and lyric poetry; principal works and authors.

SPAN809 Colonial Spanish American Literature (3 Credits)
Didactic and narrative prose; dramatic and lyric poetry.

SPAN818 National Spanish-American Literature (3 Credits)
Characteristics of the national literatures. Romantic and Costumbrista literature. Gauchismo and Indigenismo. Principal works and authors.

SPAN819 National Spanish American Literature (3 Credits)
Characteristics of the national literatures. Romantic and Costumbrista literature. Gauchismo and Indigenismo. Principal works and authors.

SPAN828 Hispanic Poetry of the Nineteenth and Twentieth Centuries (3 Credits)
Specific authors, genres and literary movements studied in depth.

SPAN829 Hispanic Poetry of the Nineteenth and Twentieth Centuries (3 Credits)
Specific authors, genres and literary movements studied in depth.

SPAN898 Pre-Candidacy Research (1-8 Credits)

SPAN899 Doctoral Dissertation Research (1-8 Credits)

SPHL - Public Health

SPHL488 Children's Health and Development Clinic (1-4 Credits)
An opportunity to acquire training and experience in a therapeutically oriented physical education-recreation program for children referred by various education, special education, medical or psychiatric groups.
Prerequisite: Permission of SPHL-School of Public Health.

SPHL498 Special Topics in Public Health (3 Credits)
Topical and interdisciplinary courses of interest to upper level undergraduate students in the field of Public Health not currently covered by the program.
Restriction: Junior standing or higher.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: SPHL498 or SPHL698 of same suffix.

SPHL600 Foundations of Public Health (3 Credits)
An overview of the goals, functions, and methods of public health. After an introduction to the core concepts and tools used in public health research and practice, applications of these methodologies are considered in the context of current controversies/problems in public health. Students work together to develop strategies for prevention and control that taken into consideration different points of view, outside research, and impacts on individuals and communities.
Restriction: Must be a graduate student within the School of Public Health.
Credit Only Granted for: SPHL100, PHSC300 or SPHL600.

SPHL601 Core Concepts in Public Health (1 Credit)
Introduces students to the history, functions, systems, policies, and models of public health practice in the United States and globally. The course offers seminars, interactive activities, and assessments aimed at establishing a baseline understanding of public health necessary for higher level and integrative learning in subsequent public health courses.
Restriction: Must be a Master's of Public Health (MPH) or Master's of Health Administration (MHA) student within the School of Public Health.

SPHL602 Foundations of Epidemiology and Biostatistics (4 Credits)
An introduction to conceptual and practical tools from epidemiology and biostatistics that are necessary for the study of public health problems. Students learn epidemiologic concepts and methods, and basic statistical concepts and procedures used in public health research through applications, hands-on experience, and interpretations of statistical findings.
Recommended: Recommend SPHL603 as a co-requisite course.
Restriction: Must be a graduate student within the School of Public Health.
Credit Only Granted for: SPHL602 or EPIB610 and EPIB650.

SPHL603 Public Health Data Laboratory (1 Credit)
An introduction to the statistical software necessary to implement the epidemiology and biostatistics concepts covered in the course EPIB 602, Foundations of Epidemiology and Biostatistics through hands-on exercises.
Corequisite: SPHL602.
Restriction: Must be a graduate student within the School of Public Health.

SPHL610 Program and Policy Planning, Implementation, and Evaluation (5 Credits)
This second course in the MPH/MHA integrated core sequence will prepare students to engage in the important tasks of assessing population and patient needs, implementing and evaluating culturally appropriate public health programs, policies, and interventions, and pursuing appropriate resources to support activities through the policy process and via effective use of power in the face of competing interests. The course will be a mix of individual and team-based assignments based upon an existing or newly identified problem, in addition to case studies, interactive simulations, and applied writing assignments.
Recommended: Completion of SPHL 601, 602, and 603 with a grade of B- or better in each. Note that completion of SPHL 601, 602, and 603 with a B- or better is a graduation requirement for the MPH/MHA degrees; and concurrent enrollment in SPHL 611.
Restriction: Must be in a graduate student in SPHL-School of Public Health.

SPHL611 Public Health Ethics (1 Credit)
Overview and discussion of ethical issues that face public health practitioners.
Prerequisite: Must have completed SPHL601; or permission of instructor.
Restriction: Must be a graduate student in the School of Public Health.
Credit Only Granted for: EPIB641, KNES689Y, or SPHL611..
Formerly: EPIB641, KNES689Y.

SPHL612 Research Ethics (1 Credit)
Overview and discussion of ethical issues that face public health researchers.
Restriction: Must be a graduate student in the School of Public Health.
Credit Only Granted for: EPIB641, KNES689Y or SPHL612.
Formerly: EPIB641, KNES689Y.

SPHL615 Crises of Aging: Time, Retirement and Widowhood (3 Credits)
A cross-disciplinary and multidisciplinary investigation of phenomena which comprise a significant portion of the issues confronting an older adult's life: (1) introduction to multiple processes of adulthood and aging; (2) the concepts and meaning of time; (3) pre-retirement and retirement adjustments; and (4) loss and widowhood.
Credit Only Granted for: HLHP615 or SPHL615.
Formerly: HLHP615.

SPHL620 Leadership, Teams, and Coalitions: Policy to Advocacy (2 Credits)
Students learn team building, leadership, and advocacy skills through the development and presentation of a policy brief on an urgent public health issue. The class will use a combination of brief lectures, discussions, and planned activities on how to develop a policy briefing. Students will have an inter-professional experience during which they will discuss possible approaches to developing policies on their public health issues while practicing team building skills. Class will culminate with presentation of policy briefs through a persuasive advocacy speech.
Prerequisite: Must have completed SPHL610.
Restriction: Must be a graduate student in the School of Public Health.

SPHL625 Issues of Retirement: Theory and Practice (3 Credits)
Multidisciplinary examination of retirement phenomena, including theories of transition, government and private sector policies, social expectations, physical correlates, personal adjustments, and economic consequences. Emphasis upon research utilization.
Credit Only Granted for: HLHP625 or SPHL625.
Formerly: HLHP625.

SPHL689 Selected Problems in Health, Physical Education and Recreation (1-6 Credits)
Research projects in special areas in health, physical education and/or recreation which have interdisciplinary implications not covered in structured courses.
Formerly: HLHP689.

SPHL698 Special Topics in Public Health (3 Credits)
Topical and interdisciplinary courses of interest to master and doctoral students in the field of Public Health not currently covered by the program.
Prerequisite: Permission of SPHL-School of Public Health.

SPHL780 Interdisciplinary Issues in Aging (3 Credits)
Multidisciplinary approaches to the processes of aging to achieve a more holistic understanding. Pedagogical research dissemination, peer instruction, guest lecturing, and informal discussion. The demonstration of the multilateral nature of growing older. Discussion of cross-disciplinary and interdisciplinary research proposals.
Credit Only Granted for: HLHP780 or SPHL780.
Formerly: HLHP780.

STAT - Statistics and Probability

STAT400 Applied Probability and Statistics I (3 Credits)
Random variables, standard distributions, moments, law of large numbers and central limit theorem. Sampling methods, estimation of parameters, testing of hypotheses.
Prerequisite: 1 course with a minimum grade of C- from (MATH131, MATH141); or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: BMGT231, ENEE324, or STAT400.
Additional Information: Not acceptable toward graduate degrees in MATH/STAT/AMSC.

STAT401 Applied Probability and Statistics II (3 Credits)
Point estimation - unbiased and consistent estimators. Interval estimation. Minimum variance and maximum likelihood estimators. Testing of hypotheses. Regression, correlation and analysis of variance. Sampling distributions. Elements of non-parametric methods.
Prerequisite: 1 course with a minimum grade of C- from (STAT400, STAT410).
Additional Information: Not acceptable toward graduate degrees in MATH/STAT/AMSC.

STAT410 Introduction to Probability Theory (3 Credits)
Probability and its properties. Random variables and distribution functions in one and several dimensions. Moments. Characteristic functions. Limit theorems.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241). Also offered as: SURV410.
Credit Only Granted for: STAT410 or SURV410.

STAT420 Introduction to Statistics (3 Credits)
Point estimation, sufficiency, completeness, Cramer-Rao inequality, maximum likelihood. Confidence intervals for parameters of normal distribution. Hypothesis testing, most powerful tests, likelihood ratio tests. Chi-square tests, analysis of variance, regression, correlation. Nonparametric methods.
Prerequisite: 1 course with a minimum grade of C- from (SURV410, STAT410). Also offered as: SURV420.
Credit Only Granted for: STAT420 or SURV420.

STAT430 Introduction to Statistical Computing with SAS (3 Credits)
Descriptive and inferential statistics. SAS software: numerical and graphical data summaries; merging, sorting and splitting data sets. Least squares, regression, graphics and informal diagnostics, interpreting results. Categorical data, lifetime data, time series. Applications to engineering, life science, business and social science.
Prerequisite: 1 course with a minimum grade of C- from (STAT400, STAT410).

STAT440 Sampling Theory (3 Credits)
Simple random sampling. Sampling for proportions. Estimation of sample size. Sampling with varying probabilities. Sampling: stratified, systematic, cluster, double, sequential, incomplete.
Prerequisite: 1 course with a minimum grade of C- from (STAT401, STAT420).
Credit Only Granted for: STAT440 or SURV440.

STAT464 Introduction to Biostatistics (3 Credits)
Probabilistic models. Sampling. Some applications of probability in genetics. Experimental designs. Estimation of effects of treatments. Comparative experiments. Fisher-Irwin test. Wilcoxon tests for paired comparisons.
Prerequisite: Must have completed one semester of calculus.
Restriction: Junior standing or higher.
Credit Only Granted for: BIOE372 or STAT464.
Additional Information: Not acceptable toward degrees in MATH/STAT.

STAT470 Actuarial Mathematics (3 Credits)
Major mathematical ideas involved in calculation of life insurance premiums, including compound interest and present valuation of future income streams; probability distribution and expected values derived from life tables; the interpolation of probability distributions from values estimated at one-year multiples; the 'Law of Large Numbers' describing the regular probabilistic behavior of large populations of independent individuals; and the detailed calculation of expected present values arising in insurance problems.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241).
Recommended: STAT400.

STAT498 Selected Topics in Statistics (1-6 Credits)
Topics of special interest to advanced undergraduate students will be offered occasionally under the general guidance of the MATH/STAT major committee. Students register for reading in statistics under this number.
Restriction: Permission of CMNS-Mathematics department.
Repeatable to: 16 credits.

STAT600 Probability Theory I (3 Credits)
Probability space; distribution functions and densities; Poissson limit theoreom; de Moivre-Laplace theorem; measure-theoretic definition of expectation; classification of measures on R; convergence of random variables; Radon-Nikodym theorem;LP spaces; conditional probabilities; independence of events, sigma-algebras and random variables; Bayes' theo rem; pi-systems and Dynkin systems; discrete Markov chains; random walks; gambler's ruin problem; Markov chains on a general phase space; Borel-cantelli lemmas; Kolmogorov inequality; three series theorem; laws of large numbers.
Prerequisite: STAT410.

STAT601 Probability Theory II (3 Credits)
Weak convergence of measures; characteristic functions; Central Limit Theorem and local limit theorem; stable laws; Kolmogorov consistency theorem (without proof); conditional expectations and martingales; optimal stopping theorem; convergence of martingales; Brownian motion; Markov processes and families; stochastic integral and Ito formula.
Prerequisite: STAT600.

STAT650 Applied Stochastic Processes (3 Credits)
Basic concepts of stochastic processes. Markov processes (discrete and continuous parameters), Random walks, Poisson processes, Birth and death processes. Renewal processes and basic limit theorems. Discrete time martingales, stopping times, optional sampling theorem. Applications from theories of stochastic epidemics, survival analysis and others.
Prerequisite: STAT410; or students who have taken courses with comparable content may contact the department.

STAT658 Advanced Applied Stochastic Processes II (3 Credits)
Advanced topics in applied stochastic processes, rotating among the headings of queueing theory, population proceses, and regenerative phenomena. Course includes disucssion of stochastic models and fields of application, Markov process theory including calculation and characterization of stationary distributions and diffusion approximations, renewal theory and Wiener-Hopf factorization theory.
Prerequisite: STAT650; and must have completed a graduate course in analysis. Or permission of instructor.
Recommended: STAT601 and STAT600.
Repeatable to: 6 credits if content differs.

STAT689 Research Interactions in Statistics (1-3 Credits)
The students participate in a vertically integrated (undergraduate, graduate and/or postdoctoral, faculty) research group. Format varies, but includes regular meetings, readings and presentations of material. See graduate program's online syllabus or contact the graduate program director for more information.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

STAT698 Selected Topics in Probability (1-4 Credits)

STAT700 Mathematical Statistics I (3 Credits)
Sampling distributions including noncentral chi-squared, t, F. Exponential families, completeness. Sufficiency, factorization, likelihood ratio. Decision theory, Bayesian methods, minimax principle. Point estimation. Lehmann-Scheffe and Cramer-Rao theorems. Set estimation.
Prerequisite: STAT410; or students who have taken courses with comparable content may contact the department.

STAT701 Mathematical Statistics II (3 Credits)
Testing hypotheses: parametric methods. Neyman-Pearson lemma. Uniformly most powerful tests. Unbiased tests. Locally optimal tests. Large sample theory, asymptotically best procedures. Nonparametric methods, Wilcoxon, Fisher-Yates, median tests. Linear models, analysis of variance, regression and correlation. Sequential analysis.
Prerequisite: STAT700; or students who have taken courses with comparable content may contact the department.

STAT702 Survival Analysis (3 Credits)
Concepts/definitions of survival functions, hazard rate or hazard function, cumulative hazard functions, mean residual life, inversion formulas; Parametric models: exponential distribution, Weibull distribution; Censored/incomplete data and real data examples; right censored data, doubly censored data, interval censored data, truncated data; Nonparametric maximal likelihood estimator for the lifetime distribution under different types of censoring (e.g., Kaplan-Meier estimator), self-consistency estimators, the EM algorithm, applications of the empirical likelihood; Semiparametric models: accelerated lifetime model, proportional hazard model, the Cox model; Goodness of fit tests and diagnostic methods for model checking.
Prerequisite: STAT410 and STAT420; or students who have taken courses with comparable content may contact the department; or permission of instructor.

STAT705 Computational Statistics (3 Credits)
Modern methods of computational statistics and their application to both practical problems and research. S-Plus and SAS programming with emphasis on S-Plus. S-Plus objects and functions, and SAS procedures. Topics include data management and graphics, Monte Carlo and simulation, bootstrapping, numerical optimization in statistics, linear and generalized linear models, nonparametric regression, time series analysis.
Prerequisite: STAT700 or STAT420.
Recommended: Have some programming experience (any language).
Credit Only Granted for: STAT705 or STAT798C.
Formerly: STAT798C.

STAT710 Advanced Statistics I (3 Credits)
Statistical decision theory. Neyman-Pearson lemma and its extensions. Uniformly most powerful test. Monotone likelihood ratio. Exponential families of distributions, concepts of similiarity, and tests with Neyman structure. Unbiased tests and applications to normal families.
Recommended: STAT600.

STAT730 Time Series Analysis (3 Credits)
The methodology of probabilistic description and statistical analysis of (primarily stationary) random sequences and processes. Correlation functions, Gaussian processes, Hilbert-space methods including Wold decomposition and spectral representation, periodogram and estimation of spectral densities, parameter estimation and model identification for ARMA processes, linear filtering, Kalman-Bucy filtering, sampling theorems for continuous-time series, multivariate time series.
Prerequisite: STAT700; and must have completed a graduate course in analysis. Or permission of instructor.
Recommended: STAT701 and STAT650.

STAT740 Linear Statistical Models I (3 Credits)
Least squares, general linear models, estimability and Gauss-Markov theorem. Simple and multiple linear regression, analysis of residuals and diagnostics, polynomial models, variable selection. Qualitative predictors, one and two way analysis of variance, multiple comparisons, analysis of covariance. Nonlinear least squares. High-level statistical computer software will be used for data analysis throughout the course.
Prerequisite: STAT700 or STAT420.

STAT741 Linear Statistical Models II (3 Credits)
Continuation of STAT 740. Multiway layouts, incomplete designs, Latin squares, complete and fractional factorial designs, crossed and nested models. Balanced random effects models, mixed models, repeated measures.General mixed model, computational algorithms, ML and REML estimates. Generalized linear models, logistic and loglinear regression.
Prerequisite: STAT740.

STAT750 Multivariate Analysis (3 Credits)
Multivariate normal, Wishart's and Hotelling's distributions. Tests of hypotheses, estimation. Generalized distance, discriminant analysis. Regression and correlation. Multivariate analysis of variance; distribution of test criteria. Principal components, canonical correlations and factor analysis.
Prerequisite: STAT700 or STAT420.

STAT770 Analysis of Categorical Data (3 Credits)
Loglinear and logistic models. Single classification, two-way classification; contingency tables; tests of homogeneity and independence models, measures of association, distribution theory. Bayesian methods. Incomplete contingency tables. Square contingency tables - symmetry. Extensions to higher dimensional contingency tables.
Prerequisite: STAT430 and STAT420; or permission of CMNS-Mathematics department.

STAT798 Selected Topics in Statistics (1-4 Credits)

STAT799 Master's Thesis Research (1-6 Credits)

STAT808 Selected Topics in Probability (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

STAT818 Selected Topics in Statistics (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

STAT898 Pre-Candidacy Research (1-8 Credits)

STAT899 Doctoral Dissertation Research (1-8 Credits)

SURV - Survey Methodology

SURV400 Fundamentals of Survey and Data Science (3 Credits)
The course introduces the student to a set of principles of survey and data science that are the basis of standard practices in these fields. The course exposes the student to key terminology and concepts of collecting and analyzing data from surveys and other data sources to gain insights and to test hypotheses about the nature of human and social behavior and interaction. It will also present a framework that will allow the student to evaluate the influence of different error sources on the quality of data.
Prerequisite: STAT100; or permission of BSOS-Joint Program in Survey Methodology department.
Restriction: Course open to SURV certificate students, SURV Advanced Special Students, and SURV undergraduate minors. Graduate students from other departments may enroll with permission from the department.
Credit Only Granted for: SURV699M or SURV400.
Formerly: SURV699M.

SURV410 Introduction to Probability Theory (3 Credits)
Probability and its properties. Random variables and distribution functions in one and several dimensions. Moments, characteristic functions, and limit theorems.
Prerequisite: MATH240 and MATH241; or permission of BSOS-Joint Program in Survey Methodology department. Also offered as: STAT410.
Credit Only Granted for: SURV410 or STAT410.

SURV420 Introduction to Statistics (3 Credits)
Mathematical statistics, presenting point estimation, sufficiency, completeness, Cramer-Rao inequality, maximum likelihood, confidence intervals for parameters of normal distributions, chi-square tests, analysis of variance, regression, correlation, and nonparametric methods.
Prerequisite: SURV410 or STAT410. Also offered as: STAT420.
Credit Only Granted for: STAT420 or SURV420.

SURV430 Fundamentals of Questionnaire Design (3 Credits)
Introduction to the scientific literature on the design, testing and evaluation of survey questionnaires, together with hands-on application of the methods discussed in class.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.
Credit Only Granted for: SURV430 or SURV630.

SURV440 Sampling Theory (3 Credits)
Simple random sampling, sampling for proportions, estimation of sample size, sampling with varying probabilities of selection, stratification, systematic selection, cluster sampling, double sampling, and sequential sampling.
Prerequisite: STAT401 or STAT420.
Credit Only Granted for: STAT440 or SURV440.

SURV600 Fundamentals of Survey and Data Science (3 Credits)
Introduces the student to a set of principles of survey and data science that are the basis of standard practices in these fields. The course exposes the student to key terminology and concepts of collecting and analyzing data from surveys and other data sources to gain insights and to test hypotheses about the nature of human and social behavior and interaction. It will also present a framework that will allow the student to evaluate the influence of different error sources on the quality of data.
Prerequisite: Any University of Maryland approved college-level statistics course.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department; and must have graduate student status.
Credit Only Granted for: SURV699M, SURV400 or SURV600.

SURV615 Statistical Modeling I (3 Credits)
First course in a two term sequence in applied statistical methods covering topics such as regression, analysis of variance, categorical data, and survival analysis.
Prerequisite: Must have completed a two course sequence in probability and statistics; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in Survey Methodology (Master's) program; or permission of instructor.

SURV616 Statistical Modeling II (3 Credits)
Builds on the introduction to linear models and data analysis provided in Statistical Methods I. Topics include analysis of longitudinal data and time series, categorical data analysis and contingency tables, logistic regression, log-linear models for counts, statistical methods in epidemiology, and introductory life testing.
Prerequisite: SURV615.

SURV617 Applications of Statistical Modeling (3 Credits)
Designed for students on both the social science and statistical tracks for the two programs in survey methodology, will provide students with exposure to applications of more advanced statistical modeling tools for both substantive and methodological investigations that are not fully covered in other MPSM or JPSM courses. Modeling techniques to be covered include multilevel modeling (with an application to methodological studies of interviewer effects), structural equation modeling (with an application of latent class models to methodological studies of measurement error), classification trees (with an application to prediction of response propensity), and alternative models for longitudinal data (with an application to panel survey data from the Health and Retirement Study). Discussions and examples of each modeling technique will be supplemented with methods for appropriately handling complex sample designs when fitting the models. The class will focus on practical applications and software rather than extensive theoretical discussions.
Prerequisite: SURV615 and SURV616; or permission of instructor.
Credit Only Granted for: SURV617, SURV746, or SURV699R.
Formerly: SURV699R and SURV746.

SURV621 Fundamentals of Data Collection I (3 Credits)
First semester of a two-semester sequence that provides a broad overview of the processes that generate data for use in social science research. Students will gain an understanding of different types of data and how they are created, as well as their relative strengths and weaknesses. A key distinction is drawn between data that are designed, primarily survey data, and those that are found, such as administrative records, remnants of online transactions, and social media content. The course combines lectures, supplemented with assigned readings, and practical exercises. In the first semester, the focus will be on the error that is inherent in data, specifically errors of representation and errors of measurement, whether the data are designed or found. The psychological origins of survey responses are examined as a way to understand the measurement error that is inherent in answers. The effects of the mode of data collection (e.g., mobile web versus telephone interview) on survey responses also are examined.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV623 Data Collection Methods in Survey Research (3 Credits)
Review of alternative data collection methods used in surveys, such as current advances in computer-assisted telephone interviewing (CATI), computer-assisted personal interviewing (CAPI), and other methods such as touchtone data entry (TDE) and voice recognition (VRE).
Prerequisite: SURV400; or students who have taken courses with comparable content may contact the department.

SURV624 Privacy Law (1 Credit)
To acquaint the students with the origins and basic principles of privacy law mainly in Europe. Furthermore, it will contrast the European privacy foundations with the U.S. approach. At the core of this course stands the new European General Data Protection Regulation (GDPR) and its applicability to specific cases and basic principles. Moreover, the course will cover current challenges to the existing privacy paradigms by big data and big data analytics.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV625 Applied Sampling (3 Credits)
Practical aspects of sample design. Topics include: probability sampling (including simple random, systematic, stratified, clustered, multistage and two-phase sampling methods), sampling with probabilities proportional to size, area sampling, telephone sampling, ratio estimation, sampling error estimation, frame problems, nonresponse, and cost factors.
Prerequisite: Must have completed a course in statistics approved by department.

SURV626 Sampling (2 Credits)
Practical aspects of sample design. The course will cover the main techniques used in sampling practice: simple random sampling, stratification, systematic selection, cluster sampling, multistage sampling, and probability proportional to size sampling. The course will also cover sampling frames, cost models, and sampling error (variance) estimation techniques.
Prerequisite: Permission of BSOS-Joint Program in Survey Methodology department; and must have completed an introductory graduate level statistics course covering material through OLS and logistic regression.

SURV627 Experimental Design for Surveys (2 Credits)
A key tool of methodological research is the split-ballot experiment, in which randomly selected subgroups of a sample receive different questions, different response formats, or different modes of data collection. In theory, such experiments can combine the clarity of experimental designs with the inferential power of representative samples. All too often, though, such experiments use flawed designs that leave serious doubts about the meaning or generalization of the findings. The purpose of this course is to consider the issues involved in the design and analysis of data from experiments embedded in surveys. It covers the purposes of experiments in surveys, examines several classic survey experiments in detail, and takes a close look at some of the pitfalls and issues in the design of such studies. These pitfalls include problem, such as the confounding of the experimental variables, that jeopardize the comparability of the experimental groups, problems, such as non response, that cast doubts on the generality of the results, and problems in determining the reliability of the results. The course will also consider some of the design decisions that almost always arise in planning experiments; issues such as identifying the appropriate error term for significance tests and including necessary comparison groups.
Prerequisite: At least one prior course in data analysis.
Recommended: Experience in the use of SAS or STATA statistical analysis software.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV630 Questionnaire Design and Evaluation (3 Credits)
The stages of questionnaire design; developmental interviewing, question writing, question evaluation, pretesting, and questionnaire ordering and formatting. Reviews of the literature on questionnaire construction, the experimental literature on question effects, and the psychological literature on information processing. Examination of the diverse challenges posed by self versus proxy reporting and special attention is paid to the relationship between mode of administration and questionnaire design.
Credit Only Granted for: SURV430 and SURV630.

SURV631 Questionnaire Design (2 Credits)
This course introduces students to the stages of questionnaire development. The course reviews the scientific literature on questionnaire construction, the experimental literature on question effects, and the psychological literature on information processing. It will also discuss the diverse challenges posed by self- versus proxy-reporting and special attention is paid to the relationship between mode of administration and questionnaire design. Students will also get hands-on experience in developing their own questionnaire.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV632 Cognition, Communication and Survey Measurement (3 Credits)
Major sources of survey error-such as reporting errors and nonresponse bias-from the perspective of social and cognitive psychology and related disciplines. Topics: psychology of memory and its bearing on classical survey issues (e.g., underreporting and telescoping); models of language use and their implications for the interpretation and misinterpretation of survey questions; and studies of attitudes, attitude change, and their possible application to increasing response rates and improving the measurement of opinions. Theories and findings from the social and behavioral sciences will be explored.

SURV635 Usability Testing for Survey Research (1 Credit)
Introduces the concepts of usability and usability testing and why they are needed for survey research. The course provides a theoretical model for understanding the respondent-survey interaction and then provides practical methods for incorporating iterative user-centered design and testing into the survey development process. The course provides techniques and examples for designing, planning, conducting and analyzing usability studies on web or mobile surveys
Recommended: Students should be familiar with the basics of questionnaire design. Experience with cognitive testing is a plus, but not a requirement.
Restriction: Must be in a major within the BSOS-Joint Program in Survey Methodology department; or permission of BSOS-Joint Program in Survey Methodology department.

SURV640 Survey Practicum I (2 Credits)
First part of an applied workshop in sample survey design, implementation, and analysis. Problems of moving from substantive concepts to questions on a survey questionnaire, designing a sample, pretesting and adminstering the survey.
Restriction: Must be in one of the following programs (Survey Methodology (Doctoral); Survey Methodology (Master's)) ; or permission of instructor.
Credit Only Granted for: SURV620 or SURV640.
Formerly: SURV620.
Additional Information: SURV640 and SURV641 must be taken in consecutive semesters.

SURV641 Survey Practicum II (2 Credits)
Second part of applied workshop in sample survey design. Course focus on post data collection process of data processing, editing and anlysis.
Prerequisite: SURV620.
Restriction: Must be in one of the following programs (Survey Methodology (Doctoral); Survey Methodology (Master's)).
Credit Only Granted for: SURV621 or SURV641.
Formerly: SURV621.
Additional Information: SURV640 and SURV641 must be taken in consecutive semesters.

SURV642 Project Consulting (6 Credits)
Students will apply the core skills that they learned in the IPSDS program to address real-world problems. The course will provide experience with the steps involved in carrying out a data consulting project, such as discussing the problems to solve with a client, data handling, and communicating work in both written and oral forms. The project is completed in teams (3-4 students per team).
Prerequisite: SURV703; and background knowledge in programming in Python and SQL structures.
Recommended: SURV736.

SURV650 Economic Measurement (3 Credits)
An introduction to the field of economic measurement. Sound economic data are of critical importance to policymakers, the business community, and others. Emphasis is placed on the economic concepts that underlie key economic statistics and the translation of those concepts into operational measures. Topics addressed include business survey sampling; the creation of business survey sampling frames; the collection of data from businesses; employment and earnings statistics; price statistics; output and productivity measures; the national accounts; and the statistical uses of administrative data. Lectures and course readings assume prior exposure to the tools of economic analysis.
Prerequisite: Must have completed a course in intermediate microeconomics.
Credit Only Granted for: SURV650 or SURV699L.
Formerly: SURV699L.

SURV656 Web Survey Methodology (1 Credit)
Fundamental concepts of web surveys and web survey design. The course is organized in 3 main sections which follow the way a proper web survey is organized: prefielding, fielding and post fielding.
Restriction: Must have completed SURV400; or must have completed SURV623; or permission of instructor. And permission of BSOS-Joint Program in Survey Methodology department.

SURV665 Introduction to Real World Data Management (2 Credits)
Data is omnipresent in the contemporary world coming in different shapes and sized: from survey data to found data. In order to make use of such data through analysis it is necessary first to import and clean it. This is often one of the most time consuming and difficult parts of data analysis. In this course you will learn both the conceptual steps needed in preparing data for analysis as well as the practical skills to do this. The course will cover all the essential skills needed to prepare data be it survey data, administrative data or found data.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV667 Introduction to Record Linkage with Big Data Applications (1 Credit)
Methods to combine data on given entities (people, households, firms etc.) that are stored in different data sources. By showing the strengths of these methods and by providing numerous practical examples the course will demonstrate the various benefits of record linkage. The participants will also learn about potential pitfalls record linkage projects may face.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV672 Introduction to the Federal Statistical System and the Survey Research Profession (1 Credit)
The U.S. statistical system and its goals are reviewed. The federal statistical agencies are described, and their primary missions and data collections are examined. The statistical systems of other countries are compared with the U.S. system. Organizational and budgetary aspects are presented. Students will learn about organizations and groups outside of the Federal Statistical System that affect the actions of the System. These include other governmental units, professional associations, and advisory groups created by the agencies themselves. Students will review current laws regarding privacy and confidentiality affecting government agency work and consider a variety of ethical issues confronting government statisticians.
Credit Only Granted for: (SURV670 and SURV671) or SURV672.
Formerly: SURV670 and SURV671.

SURV699 Special Topics in Survey Methodology (1-6 Credits)
Credit according to time scheduled and organization of the course. Organized as a lecture series on specialized advanced topics in survey methodology.
Prerequisite: Must have completed a graduate-level course in statistics or quantitive methods; and must have familiarity with survey research methods.

SURV701 Analysis of Complex Sample Data (3 Credits)
Analysis of data from complex sample designs covers: the development and handling of selection and other compensatory weights; methods for handling missing data; the effect of stratification and clustering on estimation and inference; alternative variance estimation procedures; methods for incorporating weights, stratification and clustering, and imputed values in estimation and inference procedures for complex sample survey data; and generalized design effects and variance functions. Computer software that takes account of complex sample design in estimation.
Prerequisite: SURV625.

SURV720 Total Survey Error and Data Quality I (2 Credits)
Total error structure of sample survey data, reviewing current research findings on the magnitudes of different error sources, design features that affect their magnitudes, and interrelationships among the errors. Coverage, nonresponse, sampling, measurement, and postsurvey processing errors. For each error source reviewed, social science theories about its causes and statistical models estimating the error source are described. Empirical studies from the survey methodological literature are reviewed to illustrate the relative magnitudes of error in different designs. Emphasis on aspects of the survey design necessary to estimate different error sources. Relationships to show how attempts to control one error source may increase another source. Attempts to model total survey error will be presented.
Prerequisite: SURV625.
Restriction: Permission of instructor.
Credit Only Granted for: (SURV720 and SURV721) or SURV723.
Formerly: SURV723.

SURV721 Total Survey Error and Data Quality II (2 Credits)
Second part of a review of total survey error structure of sample survey data. Reviewing current research findings on the magnitudes of different error sources. Students will continue work on an independent research project which provides empirical investigation of one or more error source. An analysis paper presenting findings of the project will be submitted at the end of the course.
Prerequisite: SURV720.
Restriction: Permission of instructor.
Credit Only Granted for: (SURV720 and SURV721) or SURV723.
Formerly: SURV723.

SURV722 Research Design: Causal inference from randomized and observational data (3 Credits)
Research designs from which causal inferences are sought. Classical experimental design will be contrasted with quasi-experiments, evaluation studies, and other observational study designs. Emphasis placed on how design features impact the nature of statistical estimation and inference from the designs. Issues of blocking, balancing, repeated measures, control strategies, etc.
Restriction: Must be in Survey Methodology (Doctoral) program; or must be in Survey Methodology (Master's) program; or must be in a major within the BSOS-Joint Program in Survey Methodology department; or permission of BSOS-Joint Program in Survey Methodology department.

SURV725 Item Nonresponse and Imputation (1 Credit)
Missing data are a common problem which can lead to biased results if the missingness is not taken into account at the analysis stage. Imputation is often suggested as a strategy to deal with item nonresponse allowing the analyst to use standard complete data methods after the imputation. However, several misconceptions about the aims and goals of imputation make some users skeptical about the approach. In this course we will illustrate why thinking about the missing data is important and clarify which goals a useful imputation method should try to achieve.
Prerequisite: Be comfortable with generalized linear models and basic probability theory through coursework or work experience; and familiarity with the statistical software R.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV726 Multiple Imputation (1 Credit)
This course will provide a detailed introduction to multiple imputation, a convenient strategy for dealing with (item) nonresponse in surveys. We will motivate the concept and illustrate why multiple imputation should generally be preferred over single imputation methods. The main focus of the course will be on strategies to generate (multiple) imputations and how to deal with common problems when applying the methods for large scale surveys. We will also discuss various options for assessing the quality of the imputations. All concepts will be demonstrated using software illustrations in R.
Prerequisite: Be comfortable with generalized linear models and basic probability theory through coursework or work experience; and familiarity with the statistical software R; and must have completed Surv 725 Item Nonresponse and Imputation or be familiar with the content through relevant work experience.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV727 Fundamentals of Computing and Data Display (3 Credits)
The first part of this course provides an introduction to web scraping and APIs for gathering data from the web and then discusses how to store and manage (big) data from diverse sources efficiently. The second part of the course demonstrates techniques for exploring and finding patterns in (non-standard) data, with a focus on data visualization. The course focuses on R as the primary computing environment, with excursus into SQL and Big Data processing tools.
Restriction: Must be in a major within the BSOS-Joint Program in Survey Methodology department; or permission of BSOS-Joint Program in Survey Methodology department.
Additional Information: Students without any R knowledge are encouraged to work through one or more R web tutorials prior or during the first weeks of the course.

SURV730 Measurement Error Models (1 Credit)
Measurement error in survey data can significantly distort analyses of substantive interest. Means, totals, and proportions will be off if the average answer people give is inaccurate. However, measurement error distorts not only estimates of means but can also severely bias apparent relationships, conditional probabilities, means differences, and other regression-type analyses. To remove such biases it is therefore essential to estimate the extent of measurement error in survey variables. This can be done using a gold standard or, in the absence of such a standard, modeling the error. This course introduces the latter and trains students to perform regression analyses without the influence of measurement error.
Prerequisite: SURV623 or SURV630; or have equivalent survey research experience. And must have completed a basic statistics course in regression modeling.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV735 Data Confidentiality and Statistical Disclosure Control (2 Credits)
This course will provide a gentle introduction to statistical disclosure control with a focus on generating synthetic data for maintaining the confidentiality of the survey respondents. The first part of the course will introduce several traditional approaches for data protection that are widely used at statistical agencies. Some limitations of these approaches will also be discussed. The second part of the course will introduce synthetic data as a possible alternative. This part of the course will discuss different approaches to generating synthetic datasets in detail. Possible modeling strategies and analytical validity evaluations will be assessed and potential measures to quantify the remaining risk of disclosure will be presented. To provide the participants with hands on experience, all steps will be illustrated using simulated and real data examples in R.
Prerequisite: Must have familiarity with the statistical software R; and must have completed a basic statistics course in regression modeling.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV736 Introduction to Web Scraping with R (1 Credit)
Provides a condensed overview of web technologies and techniques to collect data from the web in an automated way. To this end, students will use the statistical software R. The course introduces fundamental parts of web architecture and data transmission on the web. Furthermore, students will learn how to scrape content from static and dynamic web pages and connect to APIs from popular web services. Finally, practical and ethical issues of web data collection are discussed.
Prerequisite: Students are expected to be familiar with the statistical software R.
Recommended: Knowledge about the ?tidyverse? packages, in particular, dplyr, plyr, magrittr, and stringr.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV740 Fundamentals of Inference (3 Credits)
Focuses on the fundamentals of statistical inference in the finite population setting. Overview and review fundamental ideas of making inferences about populations. Basic principles of probability sampling; focus on differences between making predictions and making inferences; explore the differences between randomized study designs and observational studies; consider model-based vs. design-based analytic approaches; review techniques designed to improve efficiency using auxiliary information; and consider non-probability sampling and related inferential techniques.
Prerequisite: SURV410 and SURV420; or (SURV615 and SURV616); or permission of Instructor required.
Restriction: Must be in a major within the BSOS-Joint Program in Survey Methodology department; or permission of BSOS-Joint Program in Survey Methodology department.

SURV742 Inference from Complex Surveys (3 Credits)
Inference from complex sample survey data covering the theoretical and empirical properties of various variance estimation strategies (e.g., Taylor series approximation, replicated methods, and bootstrap methods for complex sample designs). Incorporation of those methods into inference for complex sample survey data. Variance estimation procedures applied to descriptive estimators and to analysis of categorical data. Generalized variances and design effects presented. Methods of model-based inference for complex sample surveys examined, and results contrasted to the design-based type of inference used as the standard in the course. Real survey data illustrating the methods discussed. Students will learn the use of computer software that takes account of the sample design in estimation.
Prerequisite: SURV440.

SURV744 Topics in Survey Methodology (3 Credits)
Advanced course in survey sampling theory.
Prerequisite: SURV440.

SURV745 Practical Tools for Sampling and Weighting (3 Credits)
A statistical methods class appropriate for second year Master's students and PhD students. The course will be a combination of hands-on applications and general review of the theory behinddifferent approaches to sampling and weighting. Topics covered include sample size calculations using estimation targets based on relative standard error, margin of error, and power requirements. Use of mathematical programming to determine sample sizes needed to achieve estimation goals for a series of subgroups and analysis variables. Resources for designing area probability samples. Methods of sample allocation for multistage samples. Steps in weighting, including computation of base weights, non response adjustments, and uses of auxiliary data. Non response adjustment alternatives, including weighting cell adjustments, formation of cells using regression trees, and propensity score adjustments. Weighting via post stratification, raking, general regression estimation, and other types of calibration.
Prerequisite: SURV615, SURV616, and SURV625; or permission of instructor.
Credit Only Granted for: SURV745 or SURV699E.
Formerly: SURV699E.

SURV747 Practical Tools for Sampling and Weighting Part I (2 Credits)
A statistical methods class appropriate for second year Master's students and PhD students. The course will be a combination of hands-on applications and general review of the theory behind different approaches to sampling and weighting. Topics covered include sample size calculations using estimation targets based on relative standard error, margin of error, and power requirements. Use of mathematical programming to determine sample sizes needed to achieve estimation goals for a series of subgroups and analysis variables. Resources for designing area probability samples. Methods of sample allocation for multistage samples. Base weights are discussed in context of the sample designs chosen.Note: Part II of the course will provide a more in-depth discussion on weighting.
Prerequisite: Sampling theory (e.g., SURV440 or equivalent) and Applied sampling (e.g., SURV626 or equivalent).
Recommended: Experience in the use of statistical software package R.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV751 Introduction to Big Data and Machine Learning (1 Credit)
This is an introduction to the uses and methods of working with Big data. Students explore how Big Data concepts, processes and methods can be used within the context of Survey Research.
Prerequisite: Familiarity with the statistical software R.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.
Additional Information: Familiarity with model building and model selection as well as the R program is not required but could also be helpful. Students without prior knowledge in R should plan on using free online resources to make themselves familiar with the basics of this statistical programming language.

SURV752 Introduction to Data Visualization (1 Credit)
Data visualization is one of the most powerful tools to explore, understand and communicate patterns in quantitative information. At the same time, good data visualization is a surprisingly difficult task and demands three quite different skills: substantive knowledge, statistical skill, and artistic sense. The course is intended to introduce participants to a) key principles of analytic design and useful visualization techniques for the exploration and presentation of univariate and multivariate data. This course is highly applied in nature and emphasizes the practical aspects of data visualization in the social sciences. Students will learn how to evaluate data visualizations based on principles of analytic design, how to construct compelling visualizations using the free statistics software R, and how to explore and present their data with visual methods.
Prerequisite: Basic statistics understanding and bivariate linear regression.
Recommended: Experience in the use of statistical software package R.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV760 Survey Management (3 Credits)
Modern practices in the administration of large scale surveys. Alternative management structures for large field organizations, supervisory and training regimens, handling of turnover, and multiple surveys with the same staff. Practical issues in budgeting of surveys are reviewed with examples from actual surveys. Scheduling of sequential activities in the design, data collection, and processing of data is described.

SURV772 Survey Design Seminar (3 Credits)
Students present solutions to design issues presented to the seminar. Readings are selected from literatures not treated in other classes and practical consulting problems are addressed.
Credit Only Granted for: (SURV770 and SURV771) or SURV772.
Formerly: SURV770 and SURV771.

SURV798 Advanced Topics in Survey Methodology (3 Credits)
Individual instruction.
Repeatable to: 12 credits if content differs. Also offered as: STAT798.
Credit Only Granted for: STAT798 or SURV798.

SURV819 Doctoral Research Seminar in Survey Methodology (1-6 Credits)
This is the first, two term seminar introducing the doctoral student to areas of integration of social science and statistical science approaches in the design, collection, and analysis of surveys.
Restriction: Permission of instructor.

SURV829 Doctoral Research Seminar in Survey Methodology (3-6 Credits)
An advanced research seminar for students preparing to do research or take doctoral comprehensive examinations.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

SURV898 Pre-Candidacy Research (1-8 Credits)

SURV899 Doctoral Dissertation Research (1-8 Credits)

TDPS - Theatre, Dance and Performance Studies

TDPS458 Special Topics in Advanced Performing Arts (1-3 Credits)
Designed for performing arts students. Offers instruction at an advanced level in various aspects of performance such as Voice for the Performing Arts, Movement for the Performing Arts, Acting for the Performing Arts, Partner Dance and a myriad of specific aspects within these genres.
Prerequisite: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 9 credits if content differs.

TDPS469 Advanced Practicum in Stage Management (1-3 Credits)
A graded course in stage management for theatre and/or dance productions. A hands-on laboratory experience.
Prerequisite: Minimum of 2 credits from TDPS479.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

TDPS470 Production Management (3 Credits)
To familiarize students with techniques and skills required of a Production Manager in a theatrical production. Focus will also be given to the field of event management.
Prerequisite: TDPS201, THET222, THET223, and THET116; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Credit Only Granted for: TDPS458D or TDPS470.
Formerly: TDPS458D.

TDPS479 Production Practicum (1-3 Credits)
A graded course in a specified practical aspect of mounting a theatre or dance production. It is a hands-on, purely laboratory experience.
Prerequisite: TDPS201.
Repeatable to: 10 credits if content differs.
Credit Only Granted for: TDPS479 or THET479.
Formerly: THET479.

THET - Theatre

THET408 Seminar: Theory and Performance Studies (3 Credits)
Studies in theatre theory and performance studies from classical antiquity to the present.
Repeatable to: 6 credits if content differs. Also offered as: THET608.
Credit Only Granted for: THET408 or THET608.

THET411 Voice for the Actor II (3 Credits)
Learn the International Phonetic Alphabet (IPA) and apply to exploration of sound and language. Designed to increase voice and speech awareness, and create a base knowledge from which to approach any accent or dialect.
Prerequisite: THET324 or THET325; and must audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Junior standing or higher.
Credit Only Granted for: THET311, THET411, or THET499L.
Formerly: THET311.

THET420 Language and the Actor (3 Credits)
Explores the actor's relationship to language, particularly heightened poetic language, in order to: develop the ability to embody language and vocally and physically project the images; apply an intellectual understanding of the inherent structural, poetic, and rhetorical techniques of heightened language in combination with action theory; and access the inner states of character while expressing them through text.
Prerequisite: THET325 or THET324; and must audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET424 Movement II: Advanced Studies in Movement and Mask Theatre (3 Credits)
A deeper exploration of how to use the actor's instrument for dramatic expression. Continuing work in the F.M. Alexander Technique and foundational exercise to help actors learn what they need to prepare for rehearsal and performance. Other techniques may include theatrical styles, physical character, dramatic use and play with space and rhythm and masks.
Prerequisite: THET325 or THET324; and must audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Junior standing or higher.

THET425 Actor's Process II (3 Credits)
A deeper exploration of the work begun in THET325. A continuation of creating a personal process through which the actor can confidently approach any genre of play. Special focus on status and subtext and the world of the playwright.
Prerequisite: THET325; and must audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET426 Theatrical Clown (3 Credits)
Progression of developing individual clown characters through methods based on European pedagogy which emphasizes a physical and technical approach to actor training.
Prerequisite: THET324 or THET325; and must Audition.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Credit Only Granted for: THET426, THET499C or THET 499O.
Formerly: THET499C, THET499O or THET426.

THET428 Special Topics in Advanced Theatre and Performance (1-3 Credits)
This course is offered as part of the School of Theatre, Dance, and Performance Studies' Artist in Residence program. Topics covered may include: Intercultural Theatre; Performance Art; Puppetry; Solo Performance; or Theatrical Design.
Prerequisite: THET114 or TDPS201; and (THET116, THET222, and THET223); and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Junior standing or higher.
Repeatable to: 3 credits if content differs.
Additional Information: Incorporate the change from THET 114 to TDPS 201, listing both numbers, as students will take the prerequisite under either number. To change the catalog description to reflect the proper unit name as the School of Theatre, Dance, and Performance Studies.

THET429 Actor's Studio (1-3 Credits)
Participation in dramatic roles executed under faculty supervision in the department's productions. Eligible students must make commitments and plan performances with course instructor during pre-registration.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

THET430 Directing II: Working with Actors (3 Credits)
Discussion of the preparation procedures and rehearsal practices necessary for the presentation of a variety of theatrical styles and forms. Emphasis on understanding the relationship between the director, the actor, the script and the audience. A series of student directed scenes supplemented by attendance at theatre productions.
Prerequisite: THET330; and (THET324 or THET325); and must Audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET435 Advanced Costume Construction (3 Credits)
The course is taught in a presentation/practical application format. Students will learn advanced techniques in draping and pattern development and develop proficiency in communication of design and construction choices.
Prerequisite: THET284 and THET384; and portfolio review; and permission of ARHU-School of Theatre, Dance & Performance Studies department. Also offered as: THET635.
Credit Only Granted for: THET435, THET499K, THET635, or THET669K.
Formerly: THET499K and THET669K.

THET440 Advanced Playwriting (3 Credits)
Ensemble-based writer's workshop. It is the second part of a two-course sequence and is designed for students who already have a foundation in the basics of playwriting or who are other wise well-versed in the art of theatre and dramatic structure. Through exploratory writing sequences, the reading of full-length plays, and in-class readings of work-in-progress, students will continue to deepen their craft and develop the script for a new full-length play.
Prerequisite: THET340; or permission of instructor. And permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Credit Only Granted for: THET440 or THET499P.
Formerly: THET499P.

THET451 Musical Theatre Workshop I (3 Credits)
Development of the ability to move, act and express through the media of lyric and music.
Prerequisite: Must audition.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET452 Musical Theatre Workshop II (3 Credits)
Development of the ability to move, act and express through the media of lyric and music from the integrated musicals of the 1960s through the development of concert and rock/pop musicals.
Prerequisite: Must audition.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET457 Advanced Lighting Technology (3 Credits)
Technological innovations such as moving lights, color changers, and LED are studied from the lighting designer's perspective. Students will have the opportunity to use the equipment in the lighting lab.
Prerequisite: THET377.
Restriction: Sophomore standing or higher.

THET464 Design Studio Costume (3 Credits)
Intermediate and advanced principles of theatrical costume design rendering skills. Emphasis on development of design concept, unity, character statement, and research. Particular design projects will vary.
Prerequisite: THET383; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Credit Only Granted for: THET464 or THET649.

THET465 History of Fashion for the Theatre (3 Credits)
A survey of Western clothing from the Ancient Worlds through 20th Century. A discussion of the cultural contexts of various trends in fashion through an examination of art, industry and textiles.
Prerequisite: THET116; or permission of instructor.
Restriction: Sophomore standing or higher.

THET469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

THET471 Design Studio in Scenery (3 Credits)
Advanced study of scenic design for the theatre. Particular design projects will vary.
Prerequisite: THET371; and permission of ARHU-School of Theatre, Dance & Performance Studies department. Also offered as: THET639.
Credit Only Granted for: THET471 or THET639.

THET472 Scene Painting (3 Credits)
Scene painting techniques and materials. Three-dimensional realistic scenery and non-realistic two-dimensional projects.
Prerequisite: THET114 or TDPS201; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET473 Rendering for the Theatre II (3 Credits)
Continued study in rendering techniques and graphic skills for theatrical design presentation. Emphasis on style, technique and use of different artistic media.
Prerequisite: THET373; or permission of instructor.

THET474 Advanced Stage Management (3 Credits)
Intensive practical study of the techniques and procedures for stage management.
Prerequisite: THET114 or TDPS201; and (THET116, THET222, THET223, and THET274); and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department; and sophomore standing or higher.

THET475 History of Art, Architecture, and Decor for the Theatre (3 Credits)
Study of Western art, architecture, and decor and their practical application to theatrical production.
Prerequisite: THET114 or TDPS201; and (THET116, THET222, and THET223); and permission of ARHU-School of Theatre, Dance & Performance Studies department. Also offered as: THET670.
Credit Only Granted for: THET475 or THET670.

THET477 Design Studio in Lighting (3 Credits)
Designed for students who have successfully completed THET377 and wish to further develop their lighting design skills. Emphasis is on theoretical design of productions and realized light lab projects. Particular design projects will vary.
Prerequisite: THET377; and permission of ARHU-School of Theatre, Dance & Performance Studies department. Also offered as: THET659.
Credit Only Granted for: THET477 or THET659.

THET479 Production Practicum (1-3 Credits)
Designed to expand students' practical knowledge and skills through working on Department of Theatre productions.
Prerequisite: THET116 and THET114; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits if content differs.

THET481 Theatre Graphics II: Computer Assisted Design (3 Credits)
Study and practical application of computer generated graphical design for use in theatrical production.
Prerequisite: THET114 or TDPS201; and THET116; and permission of ARHU-Theatre department.
Restriction: Sophomore standing or higher.

THET482 Scene Painting II (3 Credits)
Advanced study of theatrical scenic painting.
Prerequisite: THET472; or permission of instructor.
Restriction: Sophomore standing or higher.

THET486 History of Modern Theory & Performance (3 Credits)
Modern dramatic and performance theory from realism to the absurd with special emphasis on the European and American avant-garde.
Prerequisite: THET488 or THET489; or permission of instructor. Also offered as: THET686.
Credit Only Granted for: THET486 or THET686.

THET488 Special Topics in Theatre History Before 1800 (3 Credits)
Topics in the history of world theatre and performance from the Greeks through 1800.
Repeatable to: 6 credits if content differs.

THET489 Special Topics in Theatre History from 1800 to Present (3 Credits)
Topics in the history of world theatre and performance from 1800 to present.
Repeatable to: 6 credits if content differs.

THET497 Non-Traditional Theatre (3 Credits)
Seminar exploring American and European experimental performance since 1960. Topics include experimental theatre, performance art, pornography and performance, gender and performance, and popular culture and performance. Topics are treated historically and theoretically. Student-produced performance projects are an important component of the seminar.

THET498 Seminar: Theatre History (3 Credits)
Studies in theatre history from classical antiquity to the present.
Prerequisite: THET488 or THET489.
Restriction: Senior standing; and permission of instructor.
Repeatable to: 6 credits if content differs. Also offered as: THET698.
Credit Only Granted for: THET498 or THET698.

THET499 Independent Study (1-3 Credits)
An independent study course in which each student completes an assigned major theatre project under close faculty supervision. Projects may culminate with term papers, scenic or costume designs, or a stage production.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

THET600 Introduction to Graduate Research Methods (3 Credits)
A research and bibliography course with special emphasis on research in theatre. Required of all M.A. and M.F.A. students.Also offered as: THET700.
Credit Only Granted for: THET600 or THET700.

THET606 Teaching Theatre (1 Credit)
Strategies and materials for teaching a typical introductory course in theatre, with emphasis on specific problems of classroom instruction (e.g., creating a supportive climate, promoting active learning by students, constructing appropriate tests, adapting methods to content, and resolving discipline problems).

THET608 Seminar: Theory and Performance Studies (3 Credits)
A repeatable seminar on special topics in theory of the Theatre and Performance Studies.
Recommended: THET700 and THET600.
Repeatable to: 9 credits if content differs. Also offered as: THET408.
Credit Only Granted for: THET408 or THET608.

THET610 The American Theatre (3 Credits)
The American theatre from 1750 to 1950, including position of the theatre in the culture, its typical features, and major artists.
Recommended: THET600. Also offered as: THET410.

THET614 Ethnography and Performance (3 Credits)
Different types of cultural and artistic preformance around the world (theatre, music, dance, sport, festival) are examined. Students learn 1) how various types of live performance are studied ethnographically; 2) what thick description reveals and how it adds to the analysis of performance; and 3) methods for conducting an ethnographic study of performance.
Credit Only Granted for: ANTH688O, THET608E, or THET614.
Formerly: THET608E.

THET616 Character Development (2-3 Credits)
European-based pedagogy which emphasizes a physical and technical approach to actor training. Includes technique training in physical theatre and movement, voice, monologue writing, site-specific performance, and street theatre.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET617 Performance Internship (3 Credits)
Students design a one-semester internship in an area of interest in professional theatre. The internship will be in collaberation with one of the Department's partner theatre companies, or with another regional professional theatre. Students will complete a written self-assessment as well as an exit interview with their on-site supervisor.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET619 Special Topics in Performance Studio (2-6 Credits)
This is a rotating "special topics" course that will address the history and theory of performance in areas including: political performance, experimental theatre, and contemporary theatre. The course will be offered by guest artists/instructors who are part of the Theatre Department's professional network of scholars and artists.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET622 Performance Studio: Classical Technique (6 Credits)
Students will learn how to perform heightened language texts of global literature, including the Greeks, Moliere, the Jacobeans, Shakespeare, and works of African, Asian, or Hispanic origin.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET623 Period Movement and Verse Analysis (6 Credits)
Emphasizes movement skills related to specific theatrical styles (such as the movement of a Greek chorus in classical drama), and will include period movement, commedia dell arte, clown, and buffoon. The voice training will focus on developing singing technique, as well as accents, dialects, and dialect research.

THET627 Verse Analysis (2 Credits)
Exploration of how verse works. Looking at objective issues of verse speaking iambic pentameter and its variations, heightened versus naturalistic speech, antithesis, onomatopoeia, assonance, alliteration, and the difference between verse and prose as well as irony, ambiguity, passion, coolness, exploring character, poetry and hidden poetry.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET629 Performance Lab (1 Credit)
Students will develop a performance project based on the training that they have received in their current semester's study. This course offers students the oportunity to expand and develop their practice.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET630 Voice I (2 Credits)
Students will learn the Linklater progression of voice exercises. Work will include the discovery of sound in the body, awareness and opening of the channel, exploration of resonance, vocal freedom and range, isolating and strengthening resonating chambers and articulation exercises.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET632 Playwriting (3 Credits)
Lessons in playwriting, including character, plot, dramatic structure, dialogue, exposition, setting, and creating theatrical images.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET635 Advanced Costume Construction (3 Credits)
The course is taught in a presentation/practical application format. Students will learn advanced techniques in draping and pattern development and develop proficiency in communication of design and construction choices.
Prerequisite: THET284 and THET384; and portfolio review; and permission of ARHU-School of Theatre, Dance & Performance Studies department. Also offered as: THET435.
Credit Only Granted for: THET435, THET499K, THET635 or THET669K.
Formerly: THET499K and THET669K.

THET637 Movement Awareness (2 Credits)
Based on the F.M. Alexander Technique, students will learn to recognize habit patterns that interfere with movement, breath, voice, and expression.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET639 Advanced Design Studio in Scenery (3 Credits)
A repeatable course that allows students to progress in their design training through a series of carefully and individually structured assignments and projects.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 12 credits if content differs. Also offered as: THET471.
Credit Only Granted for: THET471 or THET639.

THET640 Voice II (2 Credits)
Build on an understanding of vocal anatomy and knowledge of habitual vocal usage, this course will challenge students to work beyond their habitual voice patterns. Emphasis will be placed on range, resonance, and vocal improvisation.
Prerequisite: THET630.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET641 Solo Performance (3 Credits)
Students will study both the history and contemporary practice of creating solo performances. A guest artist (a theatre professional drawn from the Department's professional network) will teach this course.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET642 Thesis Development (2 Credits)
Focus on writing the scripts for the thesis projects that will be performed in year three in the Festival of New Works. The course is designed to compose and finish a story in the form of a play or devised script during the course of the semester. Students will hone skills of listening and critique, and to provide a forum in which you can share and garner feedback on your work.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET643 Puppetry and Performance (3 Credits)
Students will learn the history and techniques of puppetry (Western and Non-Western).
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET647 Movement Fundamentals (2 Credits)
Based on Jacques Lecoq's technique of neutral mask and character mask.
Prerequisite: THET637.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET648 Performance Practicum (3 Credits)
A "hands-on" course providing students with opportunities to apply techniques, concepts, and principles learned in class to practical production projects in real time situations. Generally, practicum students will participate in a Main-stage production.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

THET649 Advanced Design Studio in Costume (3 Credits)
A series of carefully and individually structured assignments and projects that allows students to progress in their design training.
Repeatable to: 12 credits if content differs.
Credit Only Granted for: THET483 or THET649.

THET650 Voice III (2 Credits)
Deepening understanding and experience of the unique voice. Work will focus on identifying vocal habits, and then learning new tools such as the International Phonetic Alphabet, phrasing distinctions, and Roy Hart vocal techniques.
Prerequisite: THET640.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET652 Ensemble Devised Performance (3 Credits)
Process of developing an ensemble, and as an ensemble researching, developing and performing a devised performance. The techniques involve teaching how each solo voice must be developed in order for the ensemble voice to function efficiently.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET657 Movement Styles (2 Credits)
Based on the techniques of theatrical clown originally developed by Jacques Lecoq and further developed by Serge Martin, Phillipe Gaulier and Pierre Byland. Builds from the techniques learned with neutral and character mask work. Theatrical clown work increases a performer's flexibility, ability to pick up cues, enhances stage presence, and teaches the performer to work beyond the fourth wall.
Prerequisite: THET637.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET659 Advanced Design Studio in Lighting (3 Credits)
A repeatable course that allows students to progress in their design training through a series of carefully and individually structured assignments and projects.
Restriction: Must not have completed THET477; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 12 credits if content differs. Also offered as: THET477.
Credit Only Granted for: THET477 or THET659.

THET669 Independent Study (1-3 Credits)

THET670 Period Style for the Theatre: Fashion and Decor (3 Credits)
A study of environmental decor, theatrical architecture, historic ornament and fashion through the ages and their practical application for theatrical production.
Recommended: THET600. Also offered as: THET475.
Credit Only Granted for: THET475 or THET670.

THET672 Theory of Visual Design in Scenery (3 Credits)
A historical and theoretical study of design practices in performing arts with an emphasis in scene design and interpretation.

THET677 Production Practices (2 Credits)
Explores business practices in the field of professional theatre, including arts management, development, and marketing.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET678 Theory of Visual Design For the Performing Arts (3 Credits)
A historical and theoretical study of design practices in the performing arts.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET685 History of Theatrical Theory Before Modernism (3 Credits)
Theories of drama (written script) and theatre (performance) from fifth-century B.C. Greece through nineteenth-century romanticism.
Recommended: THET600.

THET686 History of Modern Theory (3 Credits)
Modern dramatic and performance theory from realism through postmodernism with special emphasis on the European and American avant-garde.
Recommended: THET600. Also offered as: THET486.
Formerly: THET689.

THET687 History of Performance Theory: 1960 to the Present (3 Credits)
The third in a sequence of seminars on the history of dramatic and performance theory. Focusing primarily on the European and American avant-gardes, this course examines the development of performance theory and practice from the Absurd to the present.
Recommended: THET700 or THET600. Also offered as: THET487.

THET688 Special Problems in Drama (3 Credits)
The preparation of adaptations and other projects in dramaturgy.

THET697 Performance Thesis Project (3 Credits)
The thesis project incorporates both a performance and an oral examination that assesses the student's ability to apply techniques and methods learned thoughout his/her course of study. Students will select a performance project based on their areas of expertise or interest. Performances will be videotaped and reviewed by the student's thesis committee.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET698 Seminar: Theatre History (3 Credits)
Studies in theatre history from classical antiquity to the present.
Prerequisite: THET391 and THET390; or students who have taken courses with comparable content may contact the department.
Recommended: THET600.
Repeatable to: 9 credits if content differs. Also offered as: THET498.

THET700 Introduction to Doctoral Studies in Theatre (3 Credits)
Basic skills in theatre research.
Prerequisite: Must be admitted to the Ph.D. program in Theatre. Also offered as: THET600.
Credit Only Granted for: THET600 or THET700.

THET711 Critical Theory (3 Credits)
A doctoral methods course. Major developments in modern and postmodern critical theory with particular emphasis on application to the fields of Theatre and Performance Studies.
Prerequisite: THET700.
Recommended: THET712.

THET712 Historical Research Methods and Historiography in Theatre (3 Credits)
A survey of methods commonly used in writing theatre history and their application to a suitable problem. Formulation of significant research questions, systematic collection of bibliographic and phenomenal information, formulating substantial claims, organizing and writing research for disciplinary outlets.
Prerequisite: THET700.
Formerly: PCOM712.

THET713 Performance Studies (3 Credits)
Introduces doctoral students to theoretical and methodological issues in performance studies. We will focus on 3 primary areas of research, analyzing representational strategies of adaptations, ethnography, and cultural analysis of theatrical performance.
Prerequisite: THET700.

THET788 Master's Tutorial (1-6 Credits)
Collaboration with a faculty member on joint creative and artistic projects.
Restriction: Permission of instructor.

THET789 Master's Practicum (1-6 Credits)
Participation in creative and artistic activities with professional level theatrical organizations.
Restriction: Permission of instructor.

THET799 Master's Thesis Research (1-6 Credits)

THET888 Doctoral Practicum in Theatre (1-6 Credits)
Critical analysis of a phase of a professional field of theatre. Analysis of professional activity through personal observation. Evaluation of the purpose, process, effectiveness, and efficiency of professional activity. Recommendations for training and further research.
Repeatable to: 6 credits.

THET889 Doctoral Tutorial in Theatre (1-6 Credits)
Individual research in theatre.
Repeatable to: 6 credits.

THET898 Pre-Candidacy Research (1-6 Credits)

THET899 Doctoral Dissertation Research (1-10 Credits)

TLPL - Teaching and Learning, Policy and Leadership

TLPL403 Teaching and Learning High School Mathematics (3 Credits)
Methods of teaching and assessing the high school mathematics curriculum; aligning tasks and activities to curriculum standards; lesson planning; and selection and use of technology. The course also focuses on managing large group dynamics in the high school mathematics classroom.
Prerequisite: Must have 2 semesters of calculus; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Corequisite: EDCI355.
Restriction: Must be in Secondary Educ: Mathematics program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI455 or TLPL403.
Formerly: EDCI455.

TLPL411 Student Teaching in Secondary Schools: Mathematics (12 Credits)

TLPL413 Teaching and Learning Middle School Mathematics (3 Credits)
Methods of teaching and assessing the middle school mathematics curriculum. Understanding the conceptual difficulties students have in moving from whole numbers to rational numbers, additive thinking to multiplicative thinking, and arithmetic to algebra. Lesson planning and selection of technology and other materials are applied in the context of supervised tutoring of students having difficulty in middle school mathematics. Lab and field experience required. Supervised tutoring takes place on site at a local middle school therefore TLPL413 students will be expected to travel to a local middle school for 8-10 of the class meetings.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI457 or TLPL413.
Formerly: EDCI457.

TLPL418 Teaching Residency (3-9 Credits)
An extended teaching internship in an Elementary Professional Development School. School placements to be arranged.
Prerequisite: Must have completed or be concurrently enrolled in TLPL352, TLPL363, TLPL372, TLPL415.
Restriction: Restricted to Elementary Education majors with permission of the Department. 2.75 GPA required.
Repeatable to: 12 credits.
Credit Only Granted for: TLPL418 or EDCI481.

TLPL420 Knowledge, Reasoning, and Learning in Science (3 Credits)
For prospective science teachers. Investigations of the nature of knowledge, reasoning, and learning in middle and secondary science. Readings from cognitive science and science education research; studies of student thinking in interview and classroom observations; analyses of curricula. Includes laboratory and field experiences.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: TLPL420 or EDCI411.
Formerly: EDCI411.

TLPL421 Practices in Secondary School Science Teaching (2 Credits)
Analyses of student thinking, instructional interpretations, strategies, and techniques in the teaching internship.
Prerequisite: TLPL425.
Corequisite: EDCI471 and EDCI474.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department; and must be in Secondary Educ: Science program. Or minimum cumulative GPA of 2.75.
Credit Only Granted for: TLPL421 or EDCI480.
Formerly: EDCI480.

TLPL423 Interdisciplinary Teaching in the Middle Grades I (2 Credits)
For prospective middle school teachers. Studying and planning interdisciplinary instructional practices in middle school. Utilizes context and experiences from students' field placements. Use of technology and incorporation of technology into instruction.
Prerequisite: TLPL413 and TLPL420; or permission of instructor.
Corequisite: EDCI360 and TLPL475.
Restriction: Minimum cumulative GPA of 2.75; and must be in the Middle School Teacher Education Program, major code 0804P.
Credit Only Granted for: EDCI413 or TLPL423.
Formerly: EDCI413.

TLPL424 Interdisciplinary Teaching in the Middle Grades II (2 Credits)
For prospective middle school teachers. Planning and implementing interdisciplinary instructional practices in middle school. Draws on the context of and experiences in the student teaching placement. Use of technology and incorporation of technology into instruction.
Prerequisite: EDCI360 and TLPL423.
Corequisite: TLPL476 and EDCI460.
Restriction: Minimum cumulative GPA of 2.5; and must be in the Middle School Teacher Education Program.
Credit Only Granted for: EDCI414 or TLPL424.
Formerly: EDCI414.

TLPL425 Learning and Teaching in Science (3 Credits)
Studies of student learning and instructional practices in science teaching.
Prerequisite: TLPL420; or permission of instructor.
Restriction: Must be in Secondary Educ: Science program.
Credit Only Granted for: EDCI470 or TLPL425.
Formerly: EDCI470.

TLPL430 Field Experience in Art Education (1 Credit)
Practical classroom experience in teaching/evaluating/exhibiting the products of art lessons.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department; and must be in Secondary Educ: Art program.
Credit Only Granted for: EDCI400 or TLPL430.
Formerly: EDCI400.

TLPL431 Student Teaching in Elementary School: Art (4-8 Credits)

TLPL432 Student Teaching in Secondary Schools: Art (2-8 Credits)

TLPL433 Foundations of Art Education (3 Credits)
Introduction to the field of Art Education and the role of the visual arts in grades PreK-12 for today's diverse school populations. The fundamental, historical and philosophic components of art education with an emphasis on arts disciplines and curriculum. Includes a school-based practicum. For those considering art education as a major.
Restriction: Minimum cumulative GPA of 2.75.
Credit Only Granted for: EDCI403 or TLPL433.
Formerly: EDCI403.

TLPL434 Student Teaching Seminar: Art Education (3 Credits)
An analysis of teaching theories, strategies, and techniques in the student teaching experience.
Prerequisite: TLPL435 and TLPL430.
Corequisite: TLPL432 and TLPL431.
Restriction: Minimum cumulative GPA of 2.75; and must be in Secondary Educ: Art program.
Credit Only Granted for: EDCI404 or TLPL434.
Formerly: EDCI404.

TLPL435 Art Education Methods I (3 Credits)
Methods I provides future art teachers with a knowledge base of the theories and best practices of effective pedagogy for: teaching methods and strategies, diversity, motivational techniques, classroom management, assessment and evaluation methods, and accommodating all students including those with special needs.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department. And must be in Secondary Educ: Art program; or must be in Secondary Educ: Art pre-major program.
Credit Only Granted for: EDCI405 or TLPL435.
Formerly: EDCI405.

TLPL436 Studio Processes and Materials: 2D (3 Credits)
A discussion/studio format used to develop skills, materials, resources and education strategies for using technology and two-dimensional art in K-12 programs.
Prerequisite: ARTT210.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department; and junior standing or higher; and must not be in any of the following programs (Early Childhood Education; Elementary Education; Secondary Educ: Science; Secondary Educ: English Language Arts; Secondary Educ: Mathematics; Secondary Educ: Foreign Languages; Secondary Educ: Social Studies; Physical Education; Music Education; Special Education).
Credit Only Granted for: EDCI406 or TLPL436.
Formerly: EDCI406.

TLPL437 Studio Processes and Materials: 3D (3 Credits)
A lecture-studio course to develop skills, material resources, and educational strategies for three-dimensional projects in school settings.
Restriction: Must be in Secondary Educ: Art program; or must be a Pre-Art Education Major.
Credit Only Granted for: EDCI407 or EDCI437.
Formerly: EDCI407.

TLPL440 Issues in the Education of English Language Learners (3 Credits)
Introduction to and analysis of current and historical research, practice, trends, and public policy issues in education as they relate to English language learners in K-12 and other settings.
Credit Only Granted for: EDCI432 or TLPL440.
Formerly: EDCI432.

TLPL441 Pedagogy of Teaching English Language Learners (3 Credits)
A survey of the historical and current approaches, methods, and techniques of teaching English to speakers of other languages, from grammar translation and audiolingual to communicative and task-based approaches will be presented. Additionally, successful classroom practices that address the needs of culturally diverse and language minority students will be analyzed. Students will have the opportunity to discuss, probe and apply theories and principles to hands-on teaching practices in real-life settings. Digital technologies that assist teaching English language learners (ELLs) will be emphasized as well.
Credit Only Granted for: EDCI434 or TLPL441.
Formerly: EDCI434.

TLPL442 Foundations of Literacy and Biliteracy Development (3 Credits)
An overview of the research on literacy and biliteracy development for English learners. Specifically, the course explores the theoretical models and processes of teaching reading and writing, current literacy/biliteracy issues, assessment, and strategies for developing literacy and biliteracy skills for English learners.
Credit Only Granted for: EDCI435 or TLPL442.
Formerly: EDCI435.

TLPL443 Understanding Cross-Cultural Communication for Teaching English Language Learners (3 Credits)
Theories of intercultural communication and techniques for applying them in the teaching of English as a second language (ESL) and content classes. Research and evaluation of selected aspects of a culture as basis for creating, selecting and using culturally-responsive teaching materials and methods.
Credit Only Granted for: EDCI436 or TLPL443.
Formerly: EDCI436.

TLPL444 English Grammar Pedagogy for Teachers of English Language Learners (3 Credits)
Methods of teaching English grammar to English language learners. The role of teaching grammar. Effective methods and techniques for incorporating grammar in other communication activities.
Credit Only Granted for: EDCI437 or TLPL444.
Formerly: EDCI437.

TLPL445 Methods I: K-12 World Language Methods and Technology (3 Credits)
The first of two sequential courses required for achieving competence i teaching a foreign language. The sequel to this course is EDCI433 (Methods II) entitled: Advanced K-12 Foreign Language Methods and Technology. EDCI410 requires on-going examination of theories relevant to language acquisition. Students will also investigate the instructional methods that reflect those theories. Lab and field experiences required.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI410, TLPL445, EDCI688K, or TLPL695.
Formerly: EDCI410.

TLPL446 Language Variation and Multilingualism in Elementary Classrooms (3 Credits)
Issues in language variation and multilingualism in elementary classrooms, schools and communities with a focus on classroom practice, assessment, and policy.
Restriction: Must be in Elementary Education program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.

TLPL447 Art Education Methods II (3 Credits)
Methods II builds upon the pedagogical foundation of Methods I and provides future art teachers with the means for developing pre K-12 art lessons and unit plans for a balanced qualitative art program for today's diverse and inclusive schools and classrooms.
Prerequisite: TLPL435; or students who have taken courses with comparable content may contact the department.
Corequisite: TLPL430.
Restriction: Minimum cumulative GPA of 2.75; and must be in Secondary Educ: Art program.
Credit Only Granted for: EDCI423, EDCI603, TLPL447 or TLPL633.
Formerly: EDCI423.

TLPL450 Advanced K-12 World Language Methods and Technology (3 Credits)
Teaches advanced best practices for effective foreign language instruction. Topics include: using authentic assessment and materials, applying national standards, teaching writing and culture, motivating students, providing strategy instruction, infusing technology, preparing for K-12 employment, and creating a professional portfolio.
Prerequisite: TLPL445.
Corequisite: EDCI438.
Restriction: Must be in Secondary Educ: Foreign Languages program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI433, EDCI688A, TLPL450 or TLPL696.
Formerly: EDCI433.

TLPL451 Teaching and Learning in Secondary Education: English (3 Credits)
An introduction for prospective middle and secondary English teachers into the basic issues, concepts, orientations, and processes that shape the teaching of English for diverse students in schools. Candidates explore their own perspectives in relation to local and national trends and develop basic teaching understanding and skills through on-campus seminars, teaching laboratory experiences, and guided field experiences. Students should reserve one full day or two half days per week for field experience.
Credit Only Granted for: EDCI416 or TLPL451.
Formerly: EDCI416.

TLPL452 Bases for English Language Instruction (3 Credits)
Examines current theory, research, best practice, curricula and materials focused on the teaching of English language to native and non-native English learners. Topics include morphology, syntax, semantics, vocabulary, pragmatics, argument, discourse structure, dialects, edited academic English, English language proficiency (listening, speaking, reading, writing) assessment, and instructional planning. English Language Learner (TESOL and SIOP) and special needs (inclusion) pupil issues considered.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI417 or TLPL452.
Formerly: EDCI417.

TLPL453 Life in Two Languages: Understanding Bilingual Communities and Individuals (3 Credits)
Overview of society and individual multilingualism. Topics include diglossia, language shift, codeswitching, bilingual first language acquisition, language attrition, dual language education policy and practice.

TLPL456 Teaching Writing (3 Credits)
Examines current theory, research, best practice, curricula and materials for teaching written communication in grades K-12. Focuses on analytical, argumentative, informative/explanatory, literary analysis, narrative, descriptive, and research writing. Emphasizes instructional planning, assessment, writer problem-solving strategies, information search, development, organization and style appropriate to task, purpose and audience for both non-digital and digital text. English Language Learner and special needs pupil issues considered.
Corequisite: EDCI447.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI467 or TLPL456.
Formerly: EDCI467.

TLPL457 Literature for Adolescents (3 Credits)
Reading and analysis of fiction and nonfiction; methods for critically assessing quality and appeal; current theory and methods of instruction; research on response to literature; curriculum design and selection of books.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI466 or TLPL457.
Formerly: EDCI466.

TLPL460 Materials and Instruction for Creating Skilled and Motivated Readers, Part I (3 Credits)
Selecting, evaluating, and using a variety of materials and instructional strategies to create skilled and motivated readers in the elementary grades; Topics include emergent literacy, vocabulary development, reading comprehension and oral reading fluency in diverse classroom settings.
Restriction: Must be in Elementary Education program; and junior standing or higher. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI461 or TLPL460.
Formerly: EDCI461.

TLPL461 Materials and Instruction for Creating Skilled and Motivated Readers, Part II (3 Credits)
Selecting, evaluating, and using a variety of materials to create skilled and motivated readers in the elementary grades, particularly in diverse classroom settings; Topics include word analysis, spelling, writing, reading comprehension strategies, directed reading lessons, and explicit instruction.
Prerequisite: TLPL361 and TLPL460.
Corequisite: TLPL312, EDCI342, TLPL321, and TLPL362.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department; and must be in Elementary Education program.
Credit Only Granted for: EDCI462 or TLPL461.
Formerly: EDCI462.

TLPL462 Reading in the Secondary School (3 Credits)
Provides secondary school teachers with understanding the need for and approaches to teaching students to read and learn from content area texts.
Restriction: Minimum cumulative GPA of 2.75; and must be in one of the following programs (Middle School Education; Secondary Educ: Science; Secondary Educ: English Language Arts; Secondary Educ: Mathematics; Secondary Educ: Foreign Languages; Secondary Educ: Social Studies; Secondary Educ: Art) ; and permission of department required for post-baccalaureate students.
Credit Only Granted for: EDCI463 or TLPL462.
Formerly: EDCI463.

TLPL470 Knowledge, Reasoning, and Learning in Secondary Social Studies (3 Credits)
An exploration of the nature of knowledge and reasoning in social studies disciplines as well as how students learn social studies. Assessment and investigation of students' conceptions and misconceptions as well as their disciplinary thinking. Implications for teaching and initial lesson design are explored through on-campus seminars as well as guided field experiences. Students should reserve a regular half-day per week for the field experience in local schools. This course is required for admission to the secondary social studies double major.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department; and minimum cumulative GPA of 2.75.
Credit Only Granted for: EDCI426 or TLPL470.
Formerly: EDCI426.

TLPL471 Curriculum, Teaching, and Assessment in Secondary Social Studies (3 Credits)
An exploration of curriculum development, teaching, and assessment in secondary history/social studies. Focus on identifying students' conceptions of social studies topics and designing lessons that advance students' disciplinary thinking and understanding.
Prerequisite: TLPL470.
Corequisite: EDCI428.
Restriction: Must be in Secondary Educ: Social Studies program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Center for Learning & Educational Technology.
Credit Only Granted for: EDCI427 or TLPL471.
Formerly: EDCI427.

TLPL475 Equitable Classrooms (2 Credits)
An exploration and application of major theoretical frameworks surrounding equity and critical pedagogy. Creating habits of mind that help teachers see all students as capable of achieving at high levels. Draws on the concurrent field experience.
Prerequisite: TLPL252, TLPL413, and TLPL420.
Corequisite: EDCI360 and TLPL423.
Restriction: Minimum cumulative GPA of 2.75; and must be in Middle School Education program.
Credit Only Granted for: EDCI424 or TLPL475.
Formerly: EDCI424.

TLPL476 Equity and Pedagogy (2 Credits)
An exploration and application of major theoretical frameworks surrounding equity and critical pedagogy. Pedagogical decision making that leads to greater equity and improved student learning for all students. Draws on the concurrent student teaching experience.
Prerequisite: TLPL475.
Corequisite: TLPL424 and EDCI460.
Restriction: Minimum cumulative GPA of 2.75; and must be in one of the following programs (Middle School Education; Early Childhood Education; Elementary Education; Secondary Educ: Science; Secondary Educ: English Language Arts; Secondary Educ: Mathematics; Secondary Educ: Foreign Languages; Secondary Educ: Social Studies; Physical Education; Music Education; Secondary Educ: Art; Special Education).
Credit Only Granted for: EDCI425 or TLPL476.
Formerly: EDCI425.

TLPL478 Professional Seminar in Education (1-3 Credits)
Seminar on the issues and problems teacher candidates encounter in classrooms. Exploration of the skills and strategies that best address these challenges.
Restriction: Must be in a major within the EDUC-Teaching and Learning, Policy and Leadership department.
Formerly: EDCI488.

TLPL479 Field Experiences in Education (1-12 Credits)
Field experiences in approved eduation setting with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students admitted to approved teacher education programs.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Formerly: EDCI489.

TLPL481 Embracing Diversity in the Classroom Community (3 Credits)
An exploration of the richness and complexity of student diversity that teacher candidates will encounter in K-12 classrooms. Students will engage in critical reflection around diversity and equity issues.
Restriction: Admission to teacher education program; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: TLPL481 or EDCI475.
Formerly: EDCI475.

TLPL488 Special Topics in Education (1-3 Credits)
Special and intensive treatment of current topics and issues in teaching, learning, policy and leadership.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS488 or TLPL488.
Formerly: EDPS488.

TLPL489 Internship in Education (1-12 Credits)
Internship or residency experiences in school settings with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students admitted to approved teacher education programs.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS489 or TLPL498.
Formerly: EDPS489.

TLPL498 Special Problems in Education (1-3 Credits)
Exploration of current problems in teaching, learning, policy and leadership. Available only to students who have definite plans for study of approved problems.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS498 or TLPL498.
Formerly: EDPS498.

TLPL499 Workshops, Clinics, and Institutes (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: Workshops conducted by the College of Education (or developed cooperatively with other colleges and universities) and not otherwise covered in the present course listing; clinical experiences in pupil-testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals, and supervisors.
Credit Only Granted for: EDPS499 or TLPL499.
Formerly: EDPS499.

TLPL600 Teaching and Learning with Technology (3 Credits)
Provides a concrete, hands-on introduction to teaching and learning with technology. We will explore digital technology and its impact on learning and institutions. We will consider big ideas of the field as well as specific types of learning technologies and pedagogies for use in K-12 classrooms. We will discuss K-12 teaching methods that address the interdisciplinary nature of technology integration. The course will draw on class discussions, inquiry, instructional technology, and collaborative lab-based activities and prepare you to merge technology with your current teaching practice. Assessment with and of technology will also be explored.
Credit Only Granted for: EDCI687 or TLPL600.
Formerly: EDCI687.

TLPL602 Foundations of Technology in Education (3 Credits)
Provides a big-picture survey of technology in education and lays the groundwork for future coursework on the role of technology in education. This course will tackle both theoretical and practical dimensions of technology in education. After completing this course, students will have an understanding of the potential for the uses of technology for teaching and learning, identify the different roles technology can play and be ready for a hands-on introduction to specific topics/tools/pedagogies related to teaching and learning with technology.

TLPL603 Data-driven Decision Making in Schools and Classrooms (3 Credits)
Equips educators to use the data that surrounds them productively. This includes data students generate that can be used to improve student learning outcomes as well as data generated by the classroom and school that can be used to improve pedagogy and classroom culture. After completing this course, students will be better able to collect, analyze, and make decisions based on the data generated by their students and peers.

TLPL604 Teaching Science and Social Studies through Environmental Study (3 Credits)
Curriculum and instruction for science and social studies within a multicultural and environmental context; analysis of social studies and science curriculum materials; utilization of school and community resources.
Restriction: Must be in a major within the EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI695 or TLPL604.
Formerly: EDCI695.

TLPL605 Social, Cultural & Ethical Dimensions of Teaching and Learning with Technology (3 Credits)
Situates technology in the classroom within a larger social and cultural context. Along with exploring social opportunities afforded by technology, this course will cover important cultural and ethical dimensions of technology, including equity, inclusion, access, and questions of privacy and digital citizenship (for both teachers and students). After completing this course, students will be prepared to bring technology into their classrooms in responsible and safe ways while being able to take advantage of the new forms of interaction, instruction, and communication made possible through technology.

TLPL606 Teaching and Learning Mathematics in Secondary Schools (3 Credits)
Objectives, selection and organization of subject matter, appropriate methods, lesson plans, textbooks, technology and other instructional materials; assessment of student learning and other topics pertinent to secondary mathematics education. Internship of other placement in a secondary mathematics classroom is required.
Prerequisite: Enrollment in a University of Maryland program leading to teacher certification; and bachelor's degree in mathematics or related field; and 2 semesters of calculus.
Credit Only Granted for: EDCI651 or TLPL606.
Formerly: EDCI651.

TLPL607 Teaching and Learning Mathematics in the Elementary School (3 Credits)
Strategies and methodologies for the teaching of elementary school mathematics based on current research and theories about how children learn mathematics. Attention is given to professional recommendations and teaching practices that foster communication, reasoning, and reflection in the mathematics classroom. Internship or other placement in an elementary school is required.
Prerequisite: MATH212, MATH213, or MATH214; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI652 or TLPL607.
Formerly: EDCI652.

TLPL610 Trends in Mathematics Education (3 Credits)
Recent developments in educational thinking and practice which have affected the curriculum in mathematics.
Credit Only Granted for: EDCI650 or TLPL610.
Formerly: EDCI650.

TLPL611 Teaching and Learning Number in the Middle Grades (3 Credits)
Students develop reflective, theoretical perspectives toward and practical approaches for the teaching and learning of the number system in middle school. There is an emphasis on rational numbers and its pedagogical content knowledge.
Restriction: Admission to M.A or M.Ed. w/ concentration in Mathematics Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI683 or TLPL611.
Formerly: EDCI683.

TLPL612 Teaching and Learning Algebra in the Middle School (3 Credits)
Designed to enhance middle school mathematics teachers' content and pedagogical knowledge in algebra.
Prerequisite: Admission to M.A. or M.Ed. with concentration in Mathematics Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI655 or TLPL612.
Formerly: EDCI655.

TLPL613 Problem-Solving and Innovative Thinking in the Mathematics Classroom (3 Credits)
Curriculum and instruction for developing thinking skills through the discipline of mathematics. This is a hybrid course designed to blend on-campus class meetings with online experiences.
Prerequisite: Experience teaching mathematics K-12. And TLPL312; or TLPL413; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI653 or TLPL613.
Formerly: EDCI653.

TLPL614 Assessing Mathematical Understanding (3 Credits)
Techniques of assessing k-12 students' understanding of mathematics - including standardized tests, but focusing on alternative forms such as individual interviews, writing tasks, performance tasks, portfolios. Mathematics assessment viewed as an ongoing part of instruction.
Prerequisite: TLPL610; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI654 or TLPL614.
Formerly: EDCI654.

TLPL615 Teaching and Learning Geometry in the Middle Grades (3 Credits)
Designed to enhance both the pedagogical and geometric content knowledg of middle school mathematics teachers.
Prerequisite: Admission to M.A. or M.Ed. with concentration in Mathematics Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI645 or TLPL615.
Formerly: EDCI645.

TLPL616 Teaching and Learning Statistics in the Middle School (3 Credits)
Designed to enhance both the pedagogical and statistical/data analysis content knowledge of middle school mathematics teachers.
Prerequisite: Admission to M.Ed. or M.A. program in EDCI with concentration in Mathematical Education.
Credit Only Granted for: EDCI656 or TLPL616.
Formerly: EDCI656.

TLPL617 Understanding and Engaging Students' Conceptions of Mathematics (3 Credits)
Research related to K-14 students' common errors in and (mis)understandings of mathematics. Instructional strategies useful in building on errors and changing students' conceptions.
Prerequisite: Experience in teaching math; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI657 or TLPL617.
Formerly: EDCI657.

TLPL620 Trends in School Curriculum: Science (3 Credits)
Recent developments in educational thinking and practice on the curriculum in science education.
Credit Only Granted for: EDCI670 or TLPL620.
Formerly: EDCI670.

TLPL621 Learning and Teaching in the Physical Sciences I (3 Credits)
Engagement in laboratory and inquiry-based methods to develop coherent understandings about the physical world and explore issues in the physical sciences. Personal engagements with phenomena and reflection on the learning and instructional experiences.
Restriction: Enrollment in an EDCI Outreach Program in science education; or must be in Curriculum and Instruction (Master's) program; or permission of instructor.
Credit Only Granted for: EDCI604 or TLPL621.
Formerly: EDCI604.

TLPL622 Learning and Teaching in the Physical Sciences II (3 Credits)
A second course in a sequence using laboratory and inquiry-based method to study physical science learning and teaching. Candidates will move toward more sophisticated understandings of elementary/middle school curriculum topics in the physical sciences. Personal engagement with phenomena and reflection on the learning and instructional experiences.
Prerequisite: TLPL621; or permission of instructor.
Credit Only Granted for: EDCI605 or TLPL622.
Formerly: EDCI605.

TLPL623 Learning and Teaching Biological Sciences (3 Credits)
Engagement in laboratory and inquiry-based methods to develop coherent understandings about the natural world and explore issues learning in biology. Personal engagement with phenomena and reflection on the learning and instructional experiences.
Restriction: Enrollment in an EDCI Outreach Program in science education; or must be in Curriculum and Instruction (Master's) program; or permission of instructor.
Credit Only Granted for: EDCI606 or TLPL623.
Formerly: EDCI606.

TLPL624 Learning and Teaching in the Biological Sciences II (3 Credits)
A second course in a sequence using laboratory and inquiry-based method to study learning and teaching in biology. Candidates will move toward more sophisticated understandings of elementary/middle school curriculum topics in the life sciences. Personal engagement with phenomena and reflection on the learning and instructional experiences.
Prerequisite: TLPL623; or permission of instructor.
Credit Only Granted for: EDCI607 or TLPL624.
Formerly: EDCI607.

TLPL625 Teaching Science in Elementary Schools (3 Credits)
Identification of problems in teaching science. Methods for improving the effectiveness of science education.
Credit Only Granted for: EDCI671 or TLPL625.
Formerly: EDCI671.

TLPL626 Learning to Teach and Learn Science (3 Credits)
Developing practices of instruction in science teaching in the context of understanding student science learning.
Prerequisite: TLPL420; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Restriction: Must be in the Maryland Master's Certification program; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI675 or TLPL626.
Formerly: EDCI675.

TLPL627 Reflection and Practice in Secondary School Science Teaching (3 Credits)
Use of classroom videotape and student work as data for teachers to analyze their students' thinking and discuss instructional interpretation, strategies, and techniques in the specific contexts of their classes.
Prerequisite: TLPL626; or permission of instructor.
Restriction: Must be in the Maryland Master's Certification program.
Credit Only Granted for: EDCI676 or TLPL627.
Formerly: EDCI676.

TLPL630 Trends in Art Education Curriculum (3 Credits)
Recent developments in art education.
Credit Only Granted for: EDCI600 or TLPL630.
Formerly: EDCI600.

TLPL631 Historical Foundations of the Arts in Education (3 Credits)
An investigation into major historical events and underlying beliefs, values and practices that influence contemporary arts education (visual art, drama, dance, music) at all levels of instruction. Selected literature that focuses on cultural contexts, individuals, institutions, events and national and international perspectives is used to investigate changing conceptions and practices of arts education.
Credit Only Granted for: EDCI601 or TLPL631.
Formerly: EDCI601.

TLPL632 Understanding and Teaching Aesthetics (3 Credits)
Critical investigation of art, and curriculum implications.
Credit Only Granted for: EDCI602 or TLPL632.
Formerly: EDCI602.

TLPL633 Integrated Art Methods (3 Credits)
Builds upon the pedagogical foundation of an initial art education methods course and provides future art teachers with the means for developing PreK-12 art lesson/unit plans for a balanced qualitative art program for today's diverse and inclusive schools/classrooms. Integratin g art with other subject areas.
Prerequisite: EDCI680; or TLPL435.
Restriction: Must be in a major within the EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI423, EDCI603, TLPL447 or TLPL633.
Formerly: EDCI603.

TLPL634 Teaching Language Arts in Elementary Schools (3 Credits)
Analysis of current issues, trends, and problems in language-arts instruction.
Credit Only Granted for: EDCI643 or TLPL634.
Formerly: EDCI643.

TLPL635 Coaching and Mentoring Teachers: Literacy Across Content Areas (3 Credits)
Provides knowledge on coaching and mentoring teachers in school distric and school settings based on Standards for Middle and High School Literacy Coaches as well as current theory, research and best practice supporting the efficacy of literacy coaching. Emphasis on understanding reading process/strategy instruction; writing process/strategy instruction; and gathering and interpreting valid and reliable assessment data for creating district-wide and school-based literacy intervention plans.
Prerequisite: Enrolled in EDCI post-baccalaureate certificate Program in Literacy coaching.
Restriction: Must be in Curriculum and Instruction (Master's) program; and permission of instructor.
Credit Only Granted for: EDCI646 or TLPL635.
Formerly: EDCI646.

TLPL636 Trends in Secondary School Curriculum: English (3 Credits)
Recent developments in educational thinking and practice on the curriculum in English education.
Credit Only Granted for: EDCI640 or TLPL636.
Formerly: EDCI640.

TLPL640 Assessing, Diagnosing, and Teaching Writing (3 Credits)
Examines current theory, research, best practice, curricula and materials for teaching written communication in middle and secondary schools in order to survey, review and select formal and informal assessments and diagnostic strategies useful for writing teachers. Focuses on validity and reliability issues. Includes instructional planning and development of instructional materials for implementing appropriate individual, small-group and large-group instruction. English Language Learner (TESOL and SIOP) and special needs (inclusion) pupil issues considered.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI673 or TLPL640.
Formerly: EDCI673.

TLPL641 Reading, Cognition, and Instruction: Reading in the Content Areas I (3 Credits)
Provides middle and secondary education students with an understanding of the interactive nature of the reading process, the use of research-based instructional strategies, the relationship between vocabulary development and student concept development, the design of strategic reading instruction, the methods for assessing content area literacy, and the ability to plan instruction and communicate with students, parents, and allied professionals.
Credit Only Granted for: EDCI625 or TLPL641.
Formerly: EDCI625.

TLPL642 Processes and Acquisition of Reading (3 Credits)
Addresses the ways in which social, cultural, cognitive and motivation factors influence the development of literacy. Focus is on reading acquisition and its underlying processes. Topics include language development in relation to reading development; the biological basis of this development; concepts in emergent literacy; models of reading acquisition and skilled reading; the effects of phonemic awareness and phonics on developing readers; factors in early childhood environments and in beginning literacy instruction that impact language and literacy achievement.
Restriction: For Master's Certification Students only; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI626 or TLPL642.
Formerly: EDCI626.

TLPL643 Assessing Student Learning and Development (3 Credits)
Prepares experienced teachers to assess student knowledge, strategies and skills over time so that they can design instruction that builds on student strengths and addresses student needs. Teachers will study the purposes of assessment including school and student needs. Teachers will study the purposes of assessment including school and teacher accountability, student placement, course grade assignment and instructional design. They also will explore types of formal and informal assessment, curriculum-based and curriculum-free assessment, external and teacher made assessment.
Credit Only Granted for: EDCI612 or TLPL643.
Formerly: EDCI612.

TLPL644 Foundations of Reading (3 Credits)
Broad and comprehensive overview of reading and literacy and factors that may influence effective reading practices such as instruction, classroom environment and individual differences. Focus on different knowledge domains and traditions of inquiry related to reading and reading instruction.
Prerequisite: EDCI362; or TLPL462; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI660 or TLPL644.
Formerly: EDCI660.

TLPL645 Content Area Reading (3 Credits)
Research-based strategies for improving reading to learn in the content areas (K-12).
Prerequisite: EDCI362; or TLPL462; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI661 or TLPL645.
Formerly: EDCI661.

TLPL646 Linguistics in Education (3 Credits)
Provides teachers and educational researchers with the theoretical and technical knowledge of linguistics necessary to engage effectively in their fields.

TLPL647 Diagnostic Reading Assessment and Instruction (3 Credits)
Survey course in diagnostic reading assessment and instruction for graduate students not majoring in reading.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI662 or TLPL647.
Formerly: EDCI662.

TLPL650 Understanding, Evaluating and Using Research in School Reading Programs (3 Credits)
Focus on understanding, critiquing, and applying reading/literacy research; reviewing research to improve practice; analyzing data at the district, school, classroom, and student levels to improve reading instruction.
Credit Only Granted for: EDCI663 or TLPL650.
Formerly: EDCI663.

TLPL651 Leadership in Schoolwide Reading Program (3 Credits)
Preparation of reading personnel to function as resource persons to classroom teachers, administrators and the school community.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI666 or TLPL651.
Formerly: EDCI666.

TLPL652 Multicultural Materials and Instruction for P-12 Readers (3 Credits)
An exploration of the multicultural materials and instructional strategies that create responsive P-12 classrooms and curricula for diverse readers.
Credit Only Granted for: TLPL652 or EDCI667.
Formerly: EDCI667.

TLPL653 Clinical Assessment in Reading (3 Credits)
Clinical diagnostic techniques and materials for assessing reading strengths and needs.
Prerequisite: TLPL645 and TLPL650; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI664 or TLPL653.
Formerly: EDCI664.

TLPL654 Clinical Instruction in Reading (3 Credits)
Clinical procedures and materials for reading instruction.
Prerequisite: TLPL653; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI665 or TLPL654.
Formerly: EDCI665.

TLPL655 Student Assessment in the Second Language Classroom (3 Credits)
Analysis of standardized and teacher-made FL/ESL tests; emphasis on principles of FL/ESL test construction. Field testing of commercial and teacher-made materials.
Credit Only Granted for: EDCI631 or TLPL655.
Formerly: EDCI631.

TLPL656 Special Education and Oral Language Development in TESOL (3 Credits)
Understanding of pre-referal, referal, assessment and identification process, as well as instruction of English Language Learners with learning disabilities. Required for TESOL Certification program.
Credit Only Granted for: EDCI632 or TLPL656.
Formerly: EDCI632.

TLPL657 Teaching for Cross Cultural Communication (3 Credits)
Theories of intercultural communication and techniques for applying them in the teaching of English as a second language (ESL) and content classes. Research and evaluation of selected aspects of a culture as basis for creating, selecting and using culturally-responsive teaching materials and methods.
Credit Only Granted for: EDCI633 or TLPL657.
Formerly: EDCI633.

TLPL660 Foundations of Literacy and Biliteracy Development (3 Credits)
An overview of the research on literacy and biliteracy development for English learners. Specifically, the course explores the theoretical models and processes of teaching reading and writing, current literacy/biliteracy issues, assessment, and strategies for developing literacy and biliteracy skills for English learners.
Prerequisite: TLPL665.
Credit Only Granted for: EDCI636 or TLPL660.
Formerly: EDCI636.

TLPL661 Multiliteracies: Theory and Practice (3 Credits)
Explores the theoretical constructs and practical manifestations of multiliteracies in communities and schools by presenting an overview of the research on the constructs of New Literacy Studies, Critical Literacy, Digital Literacy, and Funds of Knowledge, as well as the practical implications of teaching reading and writing to culturally and linguistically diverse learners in content areas (i.e., language arts, math, science, social studies, etc.) in classrooms.
Prerequisite: TLPL665.
Credit Only Granted for: EDCI638, EDCI688J, or TLPL661.
Formerly: EDCI638 and EDCI688J.

TLPL662 Second Language Acquisition (3 Credits)
Major theoretical approaches to second language acquisition. For teaching English to speakers of other languages (TESOL).
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI732 or TLPL662.
Formerly: EDCI732.

TLPL663 Practice and Theory in Teaching Second Language Learners (3 Credits)
Focuses on issues that arise while teaching second language (ESOL or foreign language) learners. Supports implementation of theory into practice and research-based best practices during teaching internship, and completion of teaching portfolio during a second field experience.
Corequisite: EDCI637 or EDCI689; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI613 or TLPL663.
Formerly: EDCI613.

TLPL664 Foundations of Second Language Education: Legal, Social and Historical Trends and Issues (3 Credits)
Knowledge of history, research, current practice and public policy issues in the field of second languague education from kindergarten to post-secondary settings. Required for TESOL certification program.
Credit Only Granted for: EDCI630 or TLPL664.
Formerly: EDCI630.

TLPL665 Methods of Teaching ESOL (3 Credits)
This course presents a survey of the historical and current approaches, methods, and techniques of teaching English to speakers of other languages, from grammar to translation to audiolingual and communicative approaches. Additionally, successful classroom practices that address the needs of culturally diverse and language minority students will be analyzed.
Credit Only Granted for: EDCI634 or TLPL665.
Formerly: EDCI634.

TLPL666 English Grammar for Teachers of English to Speakers of Other Languages (3 Credits)
English grammar and methods of teaching grammar for graduate, prospective and current teachers of English to speakers of other languages. Analysis of the major grammatical structures of American English. Discussion of the role of teaching grammar, and effective classroom methods and techniques for the English as a second/foreign language classroom.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI635 or TLPL666.
Formerly: EDCI635.

TLPL667 The School Curriculum (3 Credits)
A foundations course embracing the curriculum as a whole from early childhood through adolescence, including a review of historical developments, an analysis of conditions affecting curriculum change, an examination of issues in curriculum making, and a consideration of current trends in curriculum design.
Credit Only Granted for: EDPS634 or TLPL667.
Formerly: EDPS634.

TLPL668 Developing a Professional Portfolio (1-3 Credits)
Students will examine issues of performance assessment and develop professional portfolios following the guidelines established by the National Board of Professional Teaching Standards. Drawing on the research data collected throughout their program and relying on inquiry, reflections, and analysis, they will synthesize and present the body of their teaching experience.
Repeatable to: 3 credits.
Credit Only Granted for: EDCI614, EDCI619 or TLPL668.
Formerly: EDCI614.

TLPL670 Economics of Education (3 Credits)
An introduction to the application of economic principles to the study of education policy. The course content revolves around issues of efficiency, equity, and freedom of choice. Specific attention is devoted to school finance litigation and reform, practices for raising and allocating resources, and education productivity issues.
Credit Only Granted for: EDPS615 or TLPL670.
Formerly: EDPS615.

TLPL671 Education Policy Analysis (3 Credits)
Policy making in education from planning to evaluation with emphasis on the identification of policy problems and the resources available to analysts through multi-disciplinary approaches. An introductory experience with education policy analysis.
Credit Only Granted for: EDPS620 or TLPL671.
Formerly: EDPS620.

TLPL672 Impact Evaluation for Education and Public Policy (3 Credits)
Students will learn about and practice using a variety of quantitative research methods that allow for causal inferences and can be applied to estimate the impact of policies or programs in education and other policy sectors.
Prerequisite: Knowledge of multivariate regression and prior experience with statistical programming software (e.g., Stata).
Credit Only Granted for: TLPL672 or EDPS621.
Formerly: EDPS621.

TLPL673 Federal Education Policy (3 Credits)
Federal involvement in education in the United States from 1780 to the present, emphasizing the effects of legislation, court decisions, agencies, and presidential initiatives on the distribution of education opportunities.
Credit Only Granted for: TLPL673 or EDPS625.
Formerly: EDPS625.

TLPL674 Studying Student Learning in Diverse Settings (3 Credits)
This course deepens teacher understanding of student development and th cultural context for teaching through readings and focused field studies. Participants will also begin developing skills needed for investigations using methods of interpretive inquiry.
Credit Only Granted for: EDCI611 or TLPL674.
Formerly: EDCI611.

TLPL675 Embracing Diversity in Classroom Communities (3 Credits)
The course aims to help students understand race, class, gender, and sexuality as systems of privilege, exclusion, marginalization, and the centrality of embracing diversity in the classroom communities to promote the success of all students.
Credit Only Granted for: EDCI697 or TLPL675.
Formerly: EDCI697.

TLPL676 Teaching as a Profession (3 Credits)
The profession of teaching and the knowledge base that defines teaching. Current and social issues that affect teaching and learning; role of research and experience in learning to teach.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI690 or TLPL676.
Formerly: EDCI690.

TLPL677 Reframing Teacher Professionalism: Achieving Teacher Leadership (3 Credits)
Understanding the profession of teaching, teacher leadership, and the knowledge base that undergirds the teaching profession. Multiple perspectives on teaching in the current debate on school reform and how they are aligned across the political spectrum.
Credit Only Granted for: EDCI682 or TLPL677.
Formerly: EDCI682.

TLPL678 Professional Seminar in Education (1-3 Credits)
Seminar on the issues and problems teacher candidates encounter in classrooms. Exploration of the skills and strategies that best address these challenges.
Prerequisite: Admission to a masters certification program in EDCI.
Corequisite: Participation in an arranged school placement.
Credit Only Granted for: EDCI618 or TLPL678.
Formerly: EDCI618.

TLPL679 Field Experiences in Education (1-3 Credits)
Field experiences in approved educational setting with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students admitted to approved teacher education programs.
Repeatable to: 3 credits if content differs.
Formerly: EDPS689.

TLPL680 Contemporary Social Issues in Education (3 Credits)
Theoretical and practical consideration of vital social issues currently affecting education.
Credit Only Granted for: TLPL680 or EDPS601.
Formerly: EDPS601.

TLPL681 History of Education in the United States (3 Credits)
A study of the origins and development of education in the United States, emphasizing the variety of interpretive and methodological concerns that define the field.
Credit Only Granted for: TLPL681 or EDPS611.
Formerly: EDPS611.

TLPL682 Philosophy of Education (3 Credits)
A study of the great educational philosophers and systems of thought affecting the development of modern education, with particular emphasis on recent scholarship on philosophical problems in education.
Credit Only Granted for: EDPS612 or TLPL682.
Formerly: EDPS612.

TLPL683 Educational Sociology (3 Credits)
The sociological study of education as an evolving set of methods and procedures, and body of knowledge. Focuses on several major theoretical perspectives used by sociologists studying education.
Credit Only Granted for: TLPL683 or EDPS613.
Formerly: EDPS613.

TLPL684 Trends in Secondary School Curriculum: Social Studies (3 Credits)
Recent developments in educational thinking and practice on the curriculum in social studies.
Credit Only Granted for: EDCI620 or TLPL684.
Formerly: EDCI620.

TLPL685 Teaching Social Studies in Elementary Schools (3 Credits)
Examination of current literature and research in the social sciences as they relate to social studies curriculum and instruction.
Credit Only Granted for: EDCI622 or TLPL685.
Formerly: EDCI622.

TLPL686 Secondary Social Studies Pedagogy (3 Credits)
The second course in a three-course teaching methods sequence. Addresses two key questions: (1) How do secondary school students think about and learn history/social studies? (2) How can secondary teachers teach history/social studies in ways that promote student learning?
Prerequisite: TLPL470; or EDCI680.
Credit Only Granted for: EDCI627 or TLPL686.
Formerly: EDCI627.

TLPL687 Politics of Education (3 Credits)
Educational institutions as political entities. Focuses on conceptual perspectives for examining political dynamics in governmental and organizational contexts. Provides opportunities to carry out original case studies of policy making processes at various levels of the education policy system.
Credit Only Granted for: EDPS614 or TLPL687.
Formerly: EDPL614.

TLPL688 Special Topics in Education (1-3 Credits)
Special treatment of current topics and issues in teaching, learning, policy and leadership.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Formerly: EDCI688.

TLPL689 Internship in Education (1-12 Credits)
Internship or residency experiences in school settings with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students admitted to approved teacher education programs.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 12 credits if content differs.
Credit Only Granted for: EDCI689 or TLPL689.
Formerly: EDCI689.

TLPL690 Introduction to Qualitative Methods in Policy Research (3 Credits)
Introduction to research methods and designs used in studies of education policy, planning, and administration.
Credit Only Granted for: EDPS690 or TLPL690.
Formerly: EDPS690.

TLPL691 Research Methods (3 Credits)
The interpretation and conduct of research relevant to curriculum, teaching and learning.
Credit Only Granted for: EDCI685 or TLPL691.
Formerly: EDCI685.

TLPL693 Principles of Curriculum Development (3 Credits)
Curriculum planning, improvement, and evaluation in the schools; principles for the selection and organization of the content and learning experiences; ways of working in classroom and school on curriculum improvement.
Credit Only Granted for: EDPS635 or TLPL693.
Formerly: EDPS635.

TLPL694 Models of Teaching: Theories and Applications (3 Credits)
Theory and research on teaching as applied to models of instruction. Practice in developing an initial repertoire of teaching models and in providing thoughtful critique of teaching based on these models.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI691 or TLPL694.
Formerly: EDCI691.

TLPL695 Methods I: K-12 World Language Methods and Technology (3 Credits)
TLPL 695 requires on-going examination of theories relevant to language acquisition. Students will also investigate the instructional methods that reflect those theories.
Credit Only Granted for: EDCI410, TLPL445, EDCI688K, or TLPL695.
Formerly: EDCI688K.
Additional Information: Lab and field experiences required.

TLPL696 Advanced K-12 World Language Methods and Technolog (3 Credits)
Teaches advanced best practices for effective World Language instruction. Topics include: lesson planning, using authentic assessment and materials, applying national and state standards infusing culture, interdisciplinary content and technology. Classroom management procedures and strategies to create a welcoming and engaging classroom environment. Motivating students and differentiated instruction.
Prerequisite: TLPL695; and TLPL695.
Corequisite: Must be concurrently enrolled in TLPL479J.
Credit Only Granted for: EDCI433, EDCI688A, TLPL450 or TLPL696.
Formerly: EDCI688A.

TLPL698 Conducting Research on Teaching (1-3 Credits)
Analysis and improvement of educational practice. Research methods used in the study of classroom teaching. Design and conduct of an action research project. Open only to students admitted to approved teacher education programs.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 3 credits if content differs.
Formerly: EDCI698.

TLPL699 Master's Seminar (3 Credits)
Directed study for master's degree students writing seminar papers.
Credit Only Granted for: EDPS679 or TLPL699.
Formerly: EDPS679.

TLPL700 Theory and Research in Computer Education (3 Credits)
Examination of the current research and theory in the instructional uses of computers, instructional tutoring systems, computer programing environments, computer-based laboratories and problem solving environments in educational settings.
Prerequisite: TLPL600, EDMS645, and TLPL691; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI783 or TLPL700.
Formerly: EDCI783.

TLPL701 Computers in Science Education (3 Credits)
Current and projected methods by which computers can augment classroom and laboratory-based science instruction in school and non-school settings.
Prerequisite: Must have completed EDCI487; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI677 or TLPL701.
Formerly: EDCI677.

TLPL702 Theories of Learning and Leadership with Technology (3 Credits)
Exploration of the impact technology has on how people learn,and how people use technology effectively to facilitate learning. Discussion of theories of designing technology for effective teaching and learning, and examinations of the challenges of implementing technology in education systems.
Credit Only Granted for: EDCI788Q or TLPL702.
Formerly: EDCI788Q.
Additional Information: Priority will be given to students in the Technology Learning and Leadership specialization.

TLPL710 Theory and Research on Mathematical and Scientific Thinking and Learning (3 Credits)
Study of mathematical and scientific thinking by students at various levels of schooling considered from the perspective of those classic and contemporary theories of learning that are particularly relevant to the study of mathematics and science. Exploration of what it means to understand mathematics and science.
Prerequisite: Admitted to Doctoral Program in Mathematics Education or Science Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI751 or TLPL710.
Formerly: EDCI751.

TLPL711 Foundations of Mathematics Education II: Theory and Research on Mathematics Teaching (3 Credits)
Knowledge of and insights into how mathematics has been and is being taught; theories about how it might be taught. Familiarity with the methods used to do research on teaching and to improve teaching.
Prerequisite: TLPL710; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI752 or TLPL711.
Formerly: EDC752.

TLPL712 Foundations of Mathematics Education III: Curriculum (3 Credits)
The study of curriculum in mathematics and research on curriculum. The relationship of mathematics and school mathematics; the forms, purposes,development, and evaluation of mathematics curricula.
Prerequisite: Admitted to Mathematics Education Doctoral Program; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI753 or TLPL712.
Formerly: EDCI753.

TLPL713 Mathematics and Science Education Policy, Professional Development and Teacher Preparation (3 Credits)
Preservice teacher education, professional development, and policy as agents of reform in mathematics education and in science education.
Prerequisite: Admitted to Doctoral Program in Mathematics Education or Science Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI754 or TLPL713.
Formerly: EDCI754.

TLPL720 Foundations of Science Education (3 Credits)
Development of science education pre-kindergarten through college; the influences on current and future practices; and the identification and critical analysis of topics in science education.
Prerequisite: TLPL620 or TLPL625; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI770 or TLPL720.
Formerly: EDCI770.

TLPL728 Research Seminar in Mathematics and Science Education (1 Credit)
Read, plan, conduct, and report on research projects and research topics in mathematics and science education. Projects may be faculty/student projects, or group or individual student projects (may or may not be related to a dissertation). Emphasis on framing researchable questions and designing/analyzing research studies. Faculty and peer feedback and interaction are crucial expectations.
Prerequisite: Admission to Doctoral Program in Mathematics or Science Education; and must have completed or be concurrently enrolled in TLPL710 or TLPL713.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: EDCI758 or TLPL728.
Formerly: EDCI758.

TLPL730 Theory and Research in English Education (3 Credits)
A survey of the research literature; evaluation of research techniques; consideration of relevant instructional curriculum theory; evaluation of modern teaching methods and techniques.
Credit Only Granted for: EDCI740 or TLPL730.
Formerly: EDCI740.

TLPL731 Theory and Research in Written Communication (3 Credits)
Analysis and synthesis of recent theoretical trends in writing research; the reading and critiquing of representative research studies. The study of research methods for conducting disciplined inquiry in written communication.
Recommended: TLPL691.
Credit Only Granted for: EDCI745 or TLPL731.
Formerly: EDCI745.

TLPL732 Writing Across the Curriculum (3 Credits)
Emphasis on providing secondary education majors with an interdisciplinary foundation in current theory, research, and best practice focused on the teaching of writing across the curriculum, e.g.,art, English, foreign languages and TESOL, language arts, mathematics, music, sciences, and social studies. Exceptional student, inclusion, and diversity issues w ill be discussed.
Credit Only Granted for: EDCI764 or TLPL732.
Formerly: EDCI764.

TLPL733 Advanced Clinical Practices in Reading Assessment (3 Credits)
Clinical practicum in assessment focusing on strengths and needs in reading. Case report writing and conferences.
Prerequisite: TLPL654.
Corequisite: TLPL734.
Credit Only Granted for: EDCI761 or TLPL733.
Formerly: EDCI761.

TLPL734 Advanced Clinical Practices in Reading Instruction (3 Credits)
Clinical practicum in instruction focusing on instructional techniques and diagnostic teaching.
Prerequisite: TLPL654.
Corequisite: TLPL733.
Credit Only Granted for: EDCI762 or TLPL734.
Formerly: EDCI762.

TLPL738 Theory and Research in Reading (3 Credits)
Survey of the literature in reading and allied fields, and an examination of current research trends and methodologies.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 6 credits if content differs.
Formerly: EDCI769.

TLPL740 Language and Education (3 Credits)
Dialect, language varieties in school settings; historical and current perspectives on the role of language in learning; theories of school achievement and consequences for language assessment.
Credit Only Granted for: EDCI730 or TLPL740.
Formerly: EDCI730.

TLPL743 Teaching English Language Learners: Current and Future Research Directions (3 Credits)
Research on the preparation of generalists and specialists teaching English Language Learners. Current research and future research directions.
Prerequisite: TLPL771 or TLPL662; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI734 or TLPL743.
Formerly: EDCI734.

TLPL744 Research Foundations of Second Language Education: Examining Linguistically Diverse Student Learning (3 Credits)
Critically examine theories of second language acquisition and research in applied linguistics relevant to linguistically diverse students and learners of English as an additional language. Analysis of research from linguistic, psycholinguistic, sociolinguistic and sociocultural perspectives, with an emphasis on the social contexts of second language learning and teaching.
Prerequisite: TLPL664 or TLPL662; and permission of EDUC-Teaching and Learning, Policy and Leadership department. Or permission of instructor.
Credit Only Granted for: EDCI735 or TLPL744.
Formerly: EDCI735.

TLPL745 Classroom Inquiry Toward Teacher Professional Development (2 Credits)
Emphasizes current research and best practice on teacher inquiry as a mode of professional development. Participants will work within a teacher-coaching model to create a professional development presentation on writing and classroom writing instruction.

TLPL760 College Teaching (3 Credits)
Critical review of literature on teaching in higher education from conceptual and practical viewpoints. Designed for current and prospective adult educators. Focused on research and improvement of instruction.
Credit Only Granted for: EDPS757 or TLPL760.
Formerly: EDPS757.

TLPL761 History of Curriculum Theory and Development (3 Credits)
The writings of major educators in curriculum. Conceptual and formal similarities and differences between current curriculum projects and historical antecedents. Survey of curriculum materials for classroom use in their relationship to the curriculum theory of their time.
Prerequisite: TLPL693.
Restriction: Permission of EDUC-Education Policy and Leadership department.
Credit Only Granted for: EDPS732 or TLPL761.
Formerly: EDPS732.

TLPL762 Phenomenological Inquiry I (3 Credits)
Philosophic grounding for phenomenological inquiry at a beginning level Guided writing practice in doing phenomenological inquiry is provided on a selected lived experience phenomenon.
Credit Only Granted for: EDPS735 or TLPL762.
Formerly: EDPS735.

TLPL763 Phenomenological Inquiry II (3 Credits)
This advanced course in phenomenological methodology provides an expanded philosophic and methodological grounding for conducting phenomenological research. Attention is given to the development of phenomenological projects through the process of phenomenological writing. It is especially relevant for persons interested in the study of lived meanings in the domains of education, psychology, counseling, the health sciences and related academic and professional fields.
Prerequisite: TLPL762.
Credit Only Granted for: EDPS736 or TLPL763.
Formerly: EDPS736.

TLPL765 Quantitative Applicaltions for Education Policy Analysis (3 Credits)
Students use quantitative applications and secondary datasets to investigate social problems and education policies. Emphasis on the use of quasi-experimental designs and regression techniques to frame education issues, analyze, and recommend policies.
Prerequisite: EDMS645; or students who have taken courses with comparable content may contact the department.
Recommended: EDMS646; or EDMS651. Or EDMS646; and EDMS651.
Credit Only Granted for: EDPS703 or TLPL765.
Formerly: EDPS703.

TLPL766 Educational Indicators and Productivity (3 Credits)
Examination of issues in educational productivity. Focuses on educational indicators and productivity research. Explores ways to improve educational effectiveness, efficiency and equity.
Prerequisite: EDHI646 or EDHI647.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Credit Only Granted for: EDPS766 or TLPL766.
Formerly: EDPS766.

TLPL767 Law, Equity, and Diversity in Education (3 Credits)
An examination of 'dilemmas of difference' on selected issues that arise at the intersection of law and education policy. Dilemmas and value conflicts imbedded in modern federal and state case law dealing with race, gender, sexual orientation, religion and disability.
Credit Only Granted for: TLPL767 or EDPS751.
Formerly: EDPS751.

TLPL770 Black and Latino Education: History and Policy (3 Credits)
Examination of the historical legacies and contemporary policies that have contributed to the educational status (K-20) of Blacks and Latinos in the United States from the 19th century to the present. Issues surrounding language, immigration, racism, social class, and state and federal policies will also be analyzed.
Recommended: EDCI776; and completion of EDSP611 recommended.
Credit Only Granted for: EDCI786 or TLPL770.
Formerly: EDCI786.

TLPL771 Theory and Research on Teaching (3 Credits)
Analysis of the interactive process of instruction; preschool through higher education in school and non-school settings; future directions and needed research.
Credit Only Granted for: EDCI780 or TLPL771.
Formerly: EDCI780.

TLPL772 Teaching, Professional Development and School Change (3 Credits)
Examines currrent scholarship on professional development for K-12 teachers, characteristics of good professional development, and its relationship to teaching, learning, and school improvement.
Credit Only Granted for: EDCI784 or TLPL772.
Formerly: EDCI784.

TLPL773 Theory and Research in Social Studies Education (3 Credits)
A survey of the research literature; evaluation of research techniques; consideration of relevant instructional curriculum theory; evaluation of modern teaching methods and techniques.
Prerequisite: TLPL684; or TLPL685.
Credit Only Granted for: EDCI720 or TLPL773.
Formerly: EDCI720.

TLPL774 Urban Education (3 Credits)
This seminar provides students with a broad overview of urban education as a field of inquiry by examining the social context of urban schools, how transformative pedagogy is practiced and conceptualized as well as school reform.
Credit Only Granted for: EDCI776 or TLPL774.
Formerly: EDCI776.

TLPL775 Power, Privilege, Diversity and Teaching (3 Credits)
This course critically examines the theoretic foundation of multicultural education with particular emphasis on the relationship between power, privilege, diversity and teaching.
Credit Only Granted for: EDCI782 or TLPL775.
Formerly: EDCI782.

TLPL778 Scholarly Thought and Contemporary Curriculum (1-3 Credits)
Current curricular trends, issues, theory, and research in the light of past curricular and social thought.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 6 credits.
Formerly: EDPS738.

TLPL786 School Finance and Business Administration (3 Credits)
Introduction to principles and practices in the administration of the public school finance activity. Sources of tax revenue, the budget, and the function of finance in the educational program are considered.
Credit Only Granted for: EDPS676 or TLPL786.
Formerly: EDPS676.

TLPL788 Special Topics in Education (1-3 Credits)
Special and intensive treatment of current topics and issues in teaching, learning, policy and leadership.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 6 credits.

TLPL789 Internship in Education (1-3 Credits)
Approved professional experiences with appropriate supervision. Open only to students admitted to approved master's and doctoral specializations.
Repeatable to: 3 credits if content differs.
Credit Only Granted for: EDPS789 or TLPL789.
Formerly: EDPS789.

TLPL790 Seminar in Mixed Methods Research in Education (3 Credits)
Examination of epistemological and methodological issues involved in conducting mixed methods studies in education. Students design and conduct analyses using existing datasets that include qualitative and quantitative data. They formulate appropriate research questions, consider alternative mixed methods designs, and address methodological complexities associated with working with qualitative and quantitative data in a single study.
Prerequisite: EDMS646; and (EDCI791 or EDHI700); and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Recommended: EDCI792.
Credit Only Granted for: EDCI775 or TLPL790.
Formerly: EDCI775.

TLPL791 Qualitative Research I: Design and Fieldwork (3 Credits)
Examines the theoretical and epistemological moorings of different types of qualitative research. Students apply selected field research methods to problems of professional practice in schools and communities while considering central issues and dilemmas that arise while engaging in fieldwork.
Prerequisite: EDCI790.
Credit Only Granted for: EDCI791 or TLPL791.
Formerly: EDCI791.

TLPL792 Qualitative Research II: Analysis and Interpretation of Data (3 Credits)
Considers methods of on-going data analysis, ways of knowing and writing about field research, issues of reflexivity, and the ethical and political decisions involved in crafting text. Students read literature on and exemplars of multiple modes of qualitative data analysis and interpretation.
Prerequisite: TLPL791.
Credit Only Granted for: TLPL792 or EDCI792.
Formerly: EDCI792.

TLPL793 Methods of Discourse Analysis (3 Credits)
Surveys the various theoretical and methodological frameworks for doing discourse analytic investigations across disciplines.
Credit Only Granted for: EDCI788B or TLPL793.
Formerly: EDCI788B.

TLPL798 Special Problems in Education (1-6 Credits)
Exploration of current problems in teaching, learning, policy and leadership. Available only to master's or doctoral candidates under the direction of their advisors.
Formerly: EDPL798.

TLPL799 Master's Thesis Research (1-6 Credits)

TLPL820 Seminar in Science Education (3 Credits)

TLPL828 Seminar in Mathematics Education (1-3 Credits)
Survey and analysis of literature on an identified research topic in mathematics education. Design and implementation of a research study to investigate the identified topic.
Repeatable to: 6 credits.
Credit Only Granted for: EDCI858 or TLPL828.
Formerly: EDCI858.

TLPL830 Seminar in English Education (3 Credits)

TLPL840 Seminar in Reading Education (3 Credits)

TLPL841 Research Methods in Reading (3 Credits)
Current research questions and methods culminating in a study suitable for submission to journals. Emphasis on using and conducting research.
Credit Only Granted for: EDCI861 or TLPL841.
Formerly: EDCI861.

TLPL860 Seminar on Case Study Methods (3 Credits)
Conceived as both an analysis of case study methods and a laboroatory for applying course content to research topics or projects of interest to students, it addresses a range of conceptual, methodological, ethical, political, and logistical issues embedded in efforts to conduct thoughtful, "disciplined" case study research. Since this focuses on case study research, it may be particularly helpful to students who are exploring various approaches to research or who are contemplating using case study methods in their theises and/or dissertations.
Prerequisite: TLPL690; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDPS730 or TLPL860.
Formerly: EDPS730.

TLPL861 Seminar in Social Studies Education (3 Credits)

TLPL862 Race, Class, and Social Justice: A Policy Seminar in Curriculum Theory and Development (3 Credits)
An advanced seminar focusing upon critical analyses of the themes, concepts, and language relevant to Curriculum Theory, Policy, and Research. Focus on education policy issues relating to race, class, and social justice with special reference to patterns of economic and cultural distribution, their impact upon persons at society's margins and on specific curricular responses to injustice.
Prerequisite: TLPL693.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS837 or TLPL862.
Formerly: EDPS837.

TLPL888 Apprenticeship in Education (1-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS888 or TLPL888.
Formerly: EDPS888.

TLPL889 Internship in Education (3-8 Credits)
Internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS889 or TLPL889.
Formerly: EDPS889.

TLPL898 Pre-Candidacy Research (1-8 Credits)

TLPL899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 6-9 hours for an Ed.D. Project and 12-18 hours for a Ph.D. Dissertation.
Formerly: EDPS899.

TLTC - Teaching and Learning Transformation Center

TLTC708 Independent Study: Learning Analytics Research Group (1-3 Credits)
A graduate level group research course designed to support independent study of learning analytics at the University of Maryland.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

TLTC798 University Teaching and Learning (1-2 Credits)
Special topic courses directed at experienced graduate teaching assistants who are interested in university teaching and learning issues. Can be used by students for participation in the Universtiy Teaching and Learning Program.
Restriction: Permission of TLTC-Teaching and Learning Transformation Center.
Repeatable to: 6 credits if content differs.
Formerly: UNIV798.

TOXI - Toxicology

TOXI609 Methods in Toxicology (1-3 Credits)
Provides the opportunity for graduate students to become familiar with laboratory methods used by the staff to study the effect of toxins and environmental pollutants on living systems. Permission and credit arranged individually.
Restriction: Permission of CMNS-Chemical & Life Sciences department.
Repeatable to: 6 credits.

TOXI799 Masters Thesis Research (1-6 Credits)

TOXI898 Pre-Candidacy Research (1-8 Credits)

TOXI899 Doctoral Dissertation Research (1-8 Credits)

UMEI - Maryland English Institute

UMEI001 English as a Foreign Language: Beginning (12 Credits)
Intensive course for the non-native speaker of English who has little or no previous knowledge of English. Focus on the rapid acquisition of the basic features of English grammar and pronunciation and on speaking and understanding American English; reading and writing appropriate to the level will be included. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.
Restriction: Permission of EDUC-Dean-Maryland English Institute department.

UMEI002 English as a Foreign Language: Intermediate I (12 Credits)
Intensive course for the non-native speaker of English who has had some previous instruction in English. Emphasis on improving listening and speaking skills, on mastering intermediate grammatical structures, and on expanding vocabulary. Includes practice in reading and writing appropriate to the level. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.
Restriction: Permission of EDUC-Dean-Maryland English Institute department.

UMEI003 English as a Foreign Language: Intermediate II (12 Credits)
Intensive course for the non-native speaker of English who has mastered the essential structures of English grammar. Emphasis on improving communicative skills for a wide range of linguistic situations, on rapid expansion of vocabulary, and on improving reading comprehension and basic writing skills. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.
Restriction: Permission of EDUC-Dean-Maryland English Institute department.

UMEI004 English as a Foreign Language: Intermediate III (12 Credits)
Intensive course for the non-native speaker of English who has a good command of the basic features of spoken and written English. Emphasis on refining speaking and listening skills, on improving reading speed and comprehension of academic texts, and on developing writing skills for academic courses. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.
Restriction: Permission of EDUC-Dean-Maryland English Institute department.

UMEI005 Advanced English as a Foreign Language (6 Credits)
Semi-intensive course for the nearly proficient non-native speaker of English needing additional language instruction prior to undertaking full-time academic study. Speaking and listening skills; improvement of reading speed and comprehension; and development of writing skills. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.

UMEI011 Integrated English: Elementary (5 Credits)
English as a Second Language course for students at the elementary level.
Prerequisite: Placement exam; and permission of EDUC-Dean-Maryland English Institute department.

UMEI012 Integrated English: Intermediate (5 Credits)
English as a Second Language course for students at the intermediate level.
Prerequisite: Placement exam; and permission of EDUC-Dean-Maryland English Institute department.

UMEI013 Integrated English: Advanced (5 Credits)
English as a Second Language for students at the advanced level.
Prerequisite: Placement exam; and permission of EDUC-Dean-Maryland English Institute department.

UMEI028 Special Topics in English as a Second Language (1 Credit)
Focuses on particular English language topics for ESL student as indicated by title. Course intended to be taken concurrently with UMEI011, UMEI012, or UMEI013; but may be taken independently with special permission.
Repeatable to: 18 credits if content differs.

UNIV - University Courses

UNIV798 Special Topics Colloquium on University Teaching and Learning (1-3 Credits)
Special topic courses directed at experienced graduate teaching assistants who are interested in university teaching and learning issues. Can be used by students for participation in the Universtiy Teaching and Learning Program.
Restriction: Permission of UGST-Undergraduate Studies.
Repeatable to: 6 credits if content differs.

URSP - Urban Studies and Planning

URSP488 Selected Topics in Urban Studies (3 Credits)
Topics of special interest to advanced urban studies students.
Prerequisite: Permission of ARCH-Urban Studies & Planning Program department.
Repeatable to: 6 credits if content differs.

URSP600 Research Design and Application (3 Credits)
Techniques in urban research, policy analysis, and planning. Survey of descriptive and normative models. Objective and subjective measurements. Emphasis on assumptions of research.
Formerly: URSP602.

URSP601 Research Methods (3 Credits)
Use of measurement, statistics, quantitative analysis, and micro-computers in urban studies and planning.
Recommended: An undergraduate-level statistics course; and familiarity with Microsoft Excel.
Formerly: URBS601.

URSP603 Land Use Planning: Concepts and Techniques (3 Credits)
Land use concepts and definitions: legal context for planning; markets and planning; planning for housing; community services, employment, utilities, and transportation; zoning; subdivision regulations; growth management; plan implementation.
Credit Only Granted for: URSP603, URBS680, or URBS603.
Formerly: URBS603.

URSP604 The Planning Process (3 Credits)
Legal framework for U.S. planning; approaches to the planning process; tools and technology; systems thinking; defining problems and issues; soliciting goals and values; developing and making good presentations; public participation; developing and evaluating alternatives and scenarios; plan evaluation; developing RFPs.
Credit Only Granted for: URSP604, URBS656, or URBS604.
Formerly: URBS604.

URSP605 Planning History and Theory (3 Credits)
Examination of key, selected major events and issues in U.S. planning history and the development of the Yplanning profession; exploration of major themes in planning theory and practical applications of them; and analysis of the relationship of history and theory.

URSP606 Planning Economics (3 Credits)
Resource allocation in a market economy, the nature of market failures, and the justifications for public sector intervention. The limits and possibilities for planning in a market economy.
Restriction: Must not have completed URSP630.
Credit Only Granted for: URSP606, URBS606, or URBS630.
Formerly: URBS606.

URSP612 Geographic Information Systems for Urban Planning (3 Credits)
An introduction to GIS and its application to urban planning. Topics include: thematic mapping, GIS data structure, spatial analysis, Internet GIS, using census data to study urban areas, and examples of urban GIS application. Weekly laboratory and project work use ArcGIS software.
Credit Only Granted for: URSP612 or URSP688M.
Formerly: URSP688M.

URSP631 Transportation and Land Use (3 Credits)
The interrelationship between transportation and land use. What are the impacts of various transportation modes on land use patterns, and how can land use solutions influence travel demand. The integration of transportation into master planning and site impact analysis. Using quantitative methods to understand the land use and transportation linkage.
Credit Only Granted for: URSP631 or URSP688L.
Formerly: URSP688L.

URSP632 The Urban Neighborhood (3 Credits)
Urban neighborhoods as physical, socio-political and geographic entities. Residents' perceptions, urban/suburban differences, neighboring behavior, organization, planning, design concepts.
Formerly: URBS632.

URSP640 Growth Management and Environmental Planning (3 Credits)
Topics associated with growth management, defined as policies and strategies by which governments attempted to control the amount, location, pace, pattern and quality of development within their jurisdictions.

URSP661 City and Regional Economic Development Planning (3 Credits)
Spatial patterns of employment and populations, and models of urban and regional growth and decline. Focus on application of economic theory and urban planning techniques to issues of local economic development and planning.
Prerequisite: URSP606 or URSP660.
Credit Only Granted for: URSP661, URBS440, or URBS661.
Formerly: URBS661.

URSP664 Real Estate Development for Planners (3 Credits)
Planning, Architectural and Public Policy students are introduced to the real estate development process primarily from the point of view of the private entrepreneurial developer. It will include the steps in undertaking a real estate development from the initial concept to the property management and final disposition, the basic financial and tax concepts underlying real estate development, a review of national housing policy,including public-private partnerships, and solving specific real estate development problems using financial spread-sheets.
Prerequisite: URSP606.
Credit Only Granted for: URSP664 or URSP688F.
Formerly: URSP688F.

URSP671 Politics and Planning (3 Credits)
Examination of the practice of planning as a technical and a practice role. Attitudes of planners toward plan implementation. Development of effective roles for professional planners.
Formerly: URSP691.

URSP673 Community Development (3 Credits)
Examines and identifies planning approaches and methods that can help communities - particularly low income communities - become stronger, more cohesive, and more capable of serving their interests. Examines urban poverty; urban politics; history, concepts and practice of community development; and community development approaches and methods.

URSP681 Urban Planning Law (3 Credits)
Survey of the urban legal environment. Issues of planning, zoning, eminent domain, land use controls, housing codes, historic preservation and related tax provisions.
Credit Only Granted for: URSP681, URBS450, or URBS681.
Formerly: URBS681.

URSP688 Recent Developments in Urban Studies (2-6 Credits)
Examination of selected current aspects of urban affairs and planning, including, for example, <"new towns"> in the United States or neighborhood preservation in Russia. Location of course may be off-campus.
Formerly: URBS688.

URSP705 Summer Community Planning Studio I (4 Credits)
Intensive community planning group field work, typically five days a week for four weeks. Often outside the USA. Application of class work to actual planning and policy challenges. Students seeking to meet the URSP studio requirement must also take URSP 706.
Restriction: Permission of instructor.

URSP706 Summer Community Planning Studio II (2 Credits)
Intensive analysis and report-preparation of work completed in URSP 705. Held in College Park. Students seeking to meet the URSP studio requirement must also take URSP 705.
Restriction: Permission of instructor.

URSP708 Community Planning Studio (2-6 Credits)
The Community Planning Studio is a "capstone" course intended to provide students with an opportunity to apply their knowledge and skills to analyze current, pressing planning issues, in a selected community and to produce a report containing recommendations for addressing those issues. In essence, students act as a consulting team for a community client.
Prerequisite: URSP605, URSP604, URSP601, and URSP600; and permission of ARCH-Urban Studies & Planning Program department.
Repeatable to: 6 credits.
Credit Only Granted for: URSP704 or URSP708.
Formerly: URSP704.

URSP709 Field Instruction (3-6 Credits)
Students will satisfy a 300-hour internship (20 hours for 15 weeks during the spring, 25 hours a week for 12 weeks during the summer). Suitable internships are approved by the Internship Coordinator or Instructor; they involve a significant amount of planning work (preferably in the student's are of interest) and provide an appropriate on-site supervisor. The Internship Coordinator will assist students in finding a suitable internship, but the ultimate responsibility rests with each student. Whether the internship is paid or not is a matter to be worked out between the student and the organization.
Prerequisite: URSP605, URSP604, and URSP600; or permission of ARCH-Urban Studies & Planning Program department.
Repeatable to: 6 credits.
Credit Only Granted for: URSP703 or URSP709.
Formerly: URSP703.

URSP710 Research Seminar: Urban Theory and Issues (3 Credits)
An advanced research seminar for M.A. and M.C.P. students preparing their final research projects.
Prerequisite: 15 credits in URSP courses.
Restriction: Must be in Urban and Regional Planning and Design (Doctoral) program.
Formerly: URBS710.

URSP788 Independent Study in Urban Studies and Planning (1-3 Credits)
Directed research and study of selected aspects of urban affairs.
Repeatable to: 6 credits if content differs.
Formerly: URBS788.

URSP798 Readings in Urban Studies and Planning (1-3 Credits)
Directed readings in selected aspects of urban affairs and planning.
Repeatable to: 6 credits if content differs.
Formerly: URBS798.

URSP799 Master's Thesis Research (1-6 Credits)

URSP804 Advanced Planning Theory (3 Credits)
Relations between theory and practice in planning. Ways of developing and using knowledge in collective action. Challenges to organizing for planning, finding knowledge useful for planning and balancing social attachments with free inquiry.

URSP805 Seminar in Research Design (3 Credits)
Addresses fundamental aspects of research desing for Ph.D students in urban planning and policy-related fields. Topics include principles of research design, formulating a feasible hypothesis and identifying appropriate methodology for testing hypotheses eg. qualitative methods, quantitative methods, survey research. Writing of proposals and dissertation. Publication, presentation, and funding.
Prerequisite: URSP804 and URSP810.

URSP810 Contemporary Metropolitan Issues (3 Credits)
Introduces Ph.D. students to current metropolitan issues. Focus is on the historical development of the issue, problem definition, methodological approaches to its study, methodological dilemmas, and the ways that different conclusions are translated into policy. Topics vary from semester to semester but include such topics as the spatial mismatch hpothesis, the impact of urban design and form on travel behavior, the impact of technology on urban form, the justification for historic preservation, and sustainable development.
Restriction: Must be in Urban and Regional Planning and Design (Doctoral) program.

URSP898 Pre-Candidacy Research (1-8 Credits)
Selected topics in Urban Studies and Planning. Topics will vary with the instructor.
Repeatable to: 6 credits if content differs.

URSP899 Doctoral Dissertation Research (1-8 Credits)
This course is a required course for the Ph.D program in Urban and Regional Planning and Design.

USLT - Latina/o Studies

USLT488 US Latina/o Senior Seminar (3 Credits)
A variable topics seminar that exposes students to interdisciplinary critical readings, writings, and research in U.S. Latina/o Studies. Interdisciplinary research methodologies are broadly addressed. Students will gain skills and practice in reading critical analytic texts and will develop writing skills.
Recommended: USLT202 or USLT201.
Restriction: Senior standing; and permission of instructor.
Repeatable to: 9 credits if content differs.

USLT498 US Latina/o Studies: Special Topics (3 Credits)
Specific content to be announced when courses are offered.
Prerequisite: USLT202 or USLT201.
Restriction: Junior standing or higher.
Repeatable to: 9 credits if content differs.

VMSC - Veterinary Medical Sciences

VMSC600 Infectious Disease Diagnosis and Interpretation (1 Credit)
A broad exposure to many different diagnostic techniques, the appropriate use of the tests, how they are to be interpreted and the possible consequences of the diagnosis.

VMSC610 Recombinant Viral Vectors (3 Credits)
A comprehensive presentation of information on the molecular biology of the most relevent viral vectors developed to date and give insight on vector contruction, purification and utilization. Also intended for students in virology and related fields as well as to those interested in the application of viral vectors to basic research.
Restriction: Permission of instructor.

VMSC660 Emerging and Re-emerging Infectious Diseases (3 Credits)
The global burden of emerging and re-emerging infectious diseases is growing and prompts the need for effective control of these pathogens. The objective of this course is to provide graduate students with knowledge of pathogenesis and transmission of globally evolving pathogens. Registered students for this course are expected to know fundamentals of infectious diseases. References from the peer reviewed journals will be provided to facilitate understanding of the selected topics. Opening of this course is necessary to help graduate students to stay up-to-date with currently emerging pathogens and their evolution with changes in environment. This course is complementary to other existing microbiology courses (i.e., Viral Pathogenesis) on campus. Lectures focus on an in-depth analysis of a variety of topics in current infectious diseases. The course highlights recently published literatures to evaluate evolving trends in infectious diseases. The covered topics include subjects related with various pathogens and their adaptation strategy to enhance pathogenicity and transmissibility. The lectures will also cover the control and prevention measures of these pathogens.

VMSC688 Special Topics in Veterinary Medical Sciences (1-4 Credits)
Lectures and discussions on current topics in veterinary medicine s as animal disease surveillance, risk analysis, molecular epidemiolo or fish pathology. Targeted at veterinary medicine (DVM) students a other graduate students with a background in veterinary medical sciences.
Prerequisite: Permission of AGNR-Veterinary Medicine Program department.
Repeatable to: 8 credits.

VMSC689 Use of Genomics and Proteomics in Infectious Disease (3 Credits)
Focus is placed on current biotechnological development and recent research breakthroughs in the field of genomics and proteomics as it relates to infectious disease and drug/vaccine development.
Recommended: BCHM463; and (BSCI330 or BSCI230). Or by Permission.
Repeatable to: 6 credits if content differs.

VMSC698 Seminar in Veterinary Medical Science (1-3 Credits)
Presentation and discussion of scientific publications, current topics and new methodologies related to veterinary medical sciences.
Prerequisite: Permission of AGNR-Veterinary Medicine Program department.
Repeatable to: 6 credits.

VMSC699 Special Problems in Veterinary Medical Sciences (1-4 Credits)
Independent study of a specific problem related to veterinary medicine such as a disease outbreak, application of a new diagnostic test or a risk analysis related to animal health. Targeted at veterinary medicine (DVM) students and other graduate students with a background in veterinary medicine.
Prerequisite: Permission of faculty mentor.
Repeatable to: 8 credits.

VMSC700 Animal Health Policy and Communication (3 Credits)
An introduction to animal health policy with emphasis on understanding how science and politics interact and influence animal health policy and how veterinarians and animal scientists can effectively communicate science to non-scientists such as legislators and policymakers.
Recommended: ANSC225 and ANSC340.
Restriction: Must be in a major in AGNR-VA-MD Regional Col Veterinary Med; or must be in a major within the AGNR-Animal & Avian Sciences department; or must be in a major in PUAF-School of Public Policy; or permission of AGNR-VA-MD Regional Col Veterinary Med.

VMSC705 Genetics of Animal Viruses (2 Credits)
An advanced course that covers the structure and complexity of viral genomes, genome replication and expression, virus-host interactions, virus evolution, genetic principles and methodology applicable to animal viruses.

VMSC720 Viral Pathogenesis (2 Credits)
This course will teach graduate students about mechanisms of infections by animal and human viral pathogens, including virus-cell interactions, host responses, and consequences of virus infection. Particular attention will be focused on the molecular mechanisms of the interactions between virus and host.
Restriction: Permission of instructor.

VMSC760 Immunology of Infectious Diseases (3 Credits)
An advanced graduate level course that focuses on the cutting-edge knowledge of immunity and recent research breakthroughs in the interactions between host immune system and infectious pathogen, and vaccine development

VMSC770 Advanced Topics in Immunology (2 Credits)
The objective of the course is to provide students with the advanced and cutting-edge knowledge and techniques of immunology as well as research advancement in important immunologic topics. A selection of immunology area will be specifically selected with emphasis on recent research breakthroughs in the field. Therefore, the topics will be different each academic year.
Prerequisite: VMSC760; or permission of instructor.

VMSC780 Parasites of Medical and Veterinary Importance (2 Credits)
Provides students with the basic knowledge of parasites as well as research advancement in important parasites of humans and animals. Particular attention will be given to parasite biology, pathogenesis, and host responses to parasitic infection. A selection of parasites of medical and veterinary importance will be specifically covered with emphasis on recent research breakthroughs in the field.
Restriction: Permission of instructor.

VMSC799 Thesis Research (1-6 Credits)

VMSC898 Pre-Candidacy Research (1-8 Credits)

VMSC899 Dissertation Research (1-8 Credits)

WMST - Women's Studies

WMST400 Theories of Feminism (3 Credits)
A study of the multiplicity of feminist theories which have been developed to explain women's position in the family, the workplace, and society. Major feminist writings are considered in the context of their historical moment and in the context of the intellectual traditions to which they relate.
Prerequisite: 1 course in WMST; or must have completed a course cross-listed with a WMST course.

WMST408 Literature by Women Before 1800 (3 Credits)
Selected writings by women in the medieval and early modern era.
Prerequisite: Must have completed two English courses in literature; or permission of ARHU-Women's Studies department.
Repeatable to: 9 credits if content differs. Also offered as: ENGL408.
Credit Only Granted for: ENGL408 or WMST408.

WMST410 Women of the African Diaspora (3 Credits)
Explores the lives, experiences, and cultures of women of Africa and the African diaspora--African-America, the Caribbean, and Afro-Latin America. A variety of resources and materials will be used providing a distinctive interdisciplinary perspective.

WMST420 Asian American Women: The Social Construction of Gender (3 Credits)
Examines the intersection of gender, race and class as it relates to Asian American women in the United States; how institutionalized cultural and social statuses of gender, race, ethnicity and social class, produce and reproduce inequality within the lives of Asian American women.Also offered as: AAST420.
Credit Only Granted for: AAST420 or WMST420.

WMST425 Gender Roles and Social Institutions (3 Credits)
Relationship between gender roles and the structure of one or more social institutions (e.g., the economy, the family, the political system, religion, education). The incorporation of gender roles into social institutions; perpetuation or transformation of sex roles by social institutions; how changing gender roles affect social institutions.
Credit Only Granted for: SOCY425 or WMST425.

WMST428 Topics in Women's Studies (1-3 Credits)
Thematic exploration of a topic in women's studies.
Repeatable to: 9 credits if content differs.

WMST444 Feminist Critical Theory (3 Credits)
Issues in contemporary feminist thought that have particular relevance to textual studies, such as theories of language, literature, culture, interpretation, and identity.
Prerequisite: WMST200, WMST250, or ENGL250. Also offered as: ENGL444.
Credit Only Granted for: ENGL444 or WMST444.

WMST448 Literature by Women of Color (3 Credits)
Literature by women of color in the United States, Britain, and in colonial and post-colonial countries.
Prerequisite: Must complete two English courses in literature; or permission of ARHU-Women's Studies department.
Repeatable to: 9 credits if content differs. Also offered as: ENGL448.
Credit Only Granted for: ENGL448 or WMST448.

WMST452 Women in the Media (3 Credits)
Participation and portrayal of women in the mass media from colonial to contemporary times.Also offered as: JOUR452.
Credit Only Granted for: JOUR452 or WMST452.

WMST453 Victorian Women in England, France, and the United States (3 Credits)
Examines the lives of middle and upper-class women in England, France, and the United States during the Victorian era. Topics include gender roles, work, domesticity, marriage, sexuality, double standards and women's rights.Also offered as: HIST493.
Credit Only Granted for: HIST493 or WMST453.

WMST454 Women in Africa (3 Credits)
The place of women in African societies: the role and function of families; institutions such as marriage, birthing, and child rearing; ritual markers in women's lives; women in the workplace; women's associates; women's health issues; measures designed to control women's behavior; women and development.
Credit Only Granted for: HIST494 or WMST454.

WMST455 Women in Medieval Culture and Society (3 Credits)
Medieval women's identity and cultural roles: the condition, rank and rights of medieval women; their access to power; a study of women's writings and the constraints of social constructs upon the female authorial voice; and contemporary assumptions about women.Also offered as: HIST495.
Credit Only Granted for: HIST495 or WMST455.

WMST456 Women and Society in the Middle East (3 Credits)
Examines the customs, values and institutions that have shaped women's experience in the Middle East in the past and in the contemporary Middle East.
Recommended: Prior coursework in Middle East studies or gender studies. Also offered as: HIST492.
Credit Only Granted for: HIST492 or WMST456.

WMST457 Redefining Gender in the U.S., 1880-1935 (3 Credits)
Exploring changing perceptions of gender in the U.S., 1880-1935, and the impact of those changes on the day to day lives of men and women.Also offered as: HIST433.
Credit Only Granted for: HIST433 or WMST457.

WMST458 Literature by Women After 1800 (3 Credits)
Selected writings by women after 1800.
Prerequisite: Must have completed two English courses in literature; or permission of ARHU-Women's Studies department.
Repeatable to: 9 credits if content differs. Also offered as: ENGL458.
Credit Only Granted for: ENGL458 or WMST458.

WMST468 Feminist Cultural Studies (3 Credits)
Each version of this course focuses on one or several forms of popular culture -- such as TV, music, film, cyber-culture, or genre fiction (for example, science fiction) -- and demonstrates how feminists value, critique and explain such forms. Tools of feminist cultural studies include economic and social analyses of power, race, sexuality, gender, class, nationality, religion, technology, and globalization processes.
Repeatable to: 9 credits if content differs.

WMST469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

WMST471 Women's Health (3 Credits)
The women's health movement from the perspective of consumerism and feminism. The physician-patient relationship in the gynecological and other medical settings. The gynecological exam, gynecological problems, contraception, abortion, pregnancy, breast and cervical cancer and surgical procedures. Psychological aspects of gynecological concerns.
Restriction: Must be in a major within ARHU-Women's Studies department; or must be in a major within SPHL-Behavioral & Community Health department. Also offered as: HLTH471.
Credit Only Granted for: HLTH471 or WMST471.

WMST488 Senior Seminar (3 Credits)
Seminar for advanced majors in women's studies or other students with appropriate preparation. Interdisciplinary topics will vary each semester.
Restriction: Permission of ARHU-Women's Studies department.
Repeatable to: 9 credits if content differs.

WMST491 Judaism and the Construction of Gender (3 Credits)
The study of Jewish culture, religious practice, communal authority, and literature through the frame of such critical categories of analysis as gender, sexuality, masculinity, power, ethics, and the feminine.
Prerequisite: 1 course in JWST; or 1 course in LGBT; or 1 course in WMST. Also offered as: JWST491.
Credit Only Granted for: JWST419X, JWST491, or WMST491.

WMST494 Lesbian Communities and Differences (3 Credits)
The meanings of lesbian communities across many lines of difference. Using lesbian-feminists of the 1970s as a starting point, we will look both back and forward in history, tracing changes and exploring the meanings of these in their social and historical contexts.
Prerequisite: 1 course in WMST.
Recommended: WMST200 or WMST250. Also offered as: LGBT494.
Credit Only Granted for: LGBT494 or WMST494.

WMST496 African-American Women Filmmakers (3 Credits)
Examines the cinematic artistry of African-American women filmmakers and the ways in which these films address the dual and inseparable roles of race and gender.

WMST498 Advanced Special Topics in Women's Studies (1-3 Credits)

WMST499 Independent Study (1-3 Credits)
Research and writing or specific readings on a topic selected by the student and supervised by a faculty member of the Women's Studies Department.
Prerequisite: 1 course in WMST.
Restriction: Permission of ARHU-Women's Studies department.
Repeatable to: 9 credits if content differs.

WMST601 Approaches to Women's Studies I (3 Credits)
Examines two fundamental concepts in women's studies: intersectionality and interdisciplinarity. Looks at how feminisms have shaped and been shaped by knowledge-production within and across disciplinary boundaries, cultures, and paradigms. Develops an appreciation of intersectional theory as a critical research tool and as a set of responses to issues of power, domination, oppression and other loci of difference.
Prerequisite: WMST400; or students who have taken courses with comparable content may contact the department.

WMST602 Approaches to Women's Studies II (3 Credits)
Continued examination of intersectionality and interdisciplinarity with emphasis on the politics of knowledge production and identity.
Prerequisite: WMST400; or students who have taken courses with comparable content may contact the department.

WMST618 Feminist Pedagogy (3 Credits)
Examines the higher education classroom from a feminist perspective through theory and analysis. Students are graduate teaching assistants with the Women's Studies department.
Restriction: Permission of ARHU-Women's Studies department.

WMST619 Women's Studies Teaching Practicum (1 Credit)
Provides Women's Studies graduate teaching assistants with ongoing regular faculty supervision during the semesters the students are teaching WMST courses.
Prerequisite: Permission of ARHU-Women's Studies department; and WMST618; and must be a current WMST teaching assistant.
Repeatable to: 12 credits if content differs.

WMST621 Feminist Theories and Women's Movements: Genealogies (3 Credits)
Examines theories to explain the matrix of domination from the nineteenth century to the present. Students learn the key debates that produceed new insights and shifted the ground of subsequent feminist theorizing within multi-racial feminisms. Examines those debates within global perspectives. Examines how dominant theoretical frameworks have been developed at specific historical moments.
Prerequisite: WMST400; or permission of ARHU-Women's Studies department.

WMST628 Women's Studies Colloquium (1 Credit)
An intensive advanced exploration of current problems and issues in women's studies.
Repeatable to: 12 credits if content differs.

WMST698 Special Topics in Women's Studies (1-3 Credits)
Advanced worik in selected topics in Women's Studies.
Prerequisite: WMST400; or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits if content differs.

WMST699 Independent Study (1-3 Credits)
Research and writing on specific readings on a topic selected by the student which is approved and supervised by a faculty member of the Women's Studies Department.
Restriction: Permission of instructor.

WMST708 Research Seminar in Women's Studies (3 Credits)
This seminar provides an opportunity for those students interested in pursuing feminist research and teaching to synthesize and explore feminist analyses of university life, including research and writing methods, learning styles, curricular issues, and the "chilly climate" for women.
Restriction: Permission of instructor.
Repeatable to: 9 credits if content differs.

WMST709 Directed Independent Reading for Major Field Exam (1-4 Credits)
Directed reading in preparation for Major Field Exam. In consultation with their advisors, students identify, analyze, critique and synthesize material relevant to their major fields of inquiry. Grading will be based on combinations of oral performance in the bi-weekly meetings, production of annotated bibliographies and synthetic papers.
Restriction: Permission of ARHU-Women's Studies department.

WMST799 Masters Thesis Research (1-6 Credits)

WMST898 Pre-Candidacy Research (1-8 Credits)

WMST899 Doctoral Dissertation Research (1-8 Credits)

POLICIES

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Admissions Policies

Admission to Graduate School

Responsibility for admitting applicants to graduate programs rests with the Dean of the Graduate School. Academic department and program offices review admissions applications and credentials and make admissions recommendations to the Graduate Dean. In cases where credentials were earned abroad, the Graduate School admissions staff will evaluate to ensure that the applicant has the equivalent of an accredited 4 year U.S. baccalaureate degree. The standards maintained by the Graduate School and individual departments and programs are applied to ensure that applicants admitted to the University are well qualified and trained to study at this institution and have a reasonable expectation of successfully completing a graduate program. Standards for admission to doctoral degree programs are frequently higher than those for admission to master's degree programs. In many degree programs, the number of applications received from individuals qualified for graduate study regularly exceeds the number of applicants who can be accommodated. In such cases, only the most highly qualified are offered admission. The number of spaces available in various departments is limited according to the availability of faculty, special resources, and funds for students requiring financial assistance.

Criteria for Admission

Those applicants who have earned or will earn a bachelor's degree at a regionally accredited college or university in the United States (or the equivalent of a baccalaureate degree from a nationally recognized institution in another country) are eligible to be considered for admission to the Graduate School at the University of Maryland. With the exception of established dual-degree programs, an applicant can matriculate in only one graduate program at a time.

Admission to graduate programs is highly competitive, and space is limited. The decision to admit an applicant to a program is based primarily on a combination of the following criteria, evaluated from a complete application:

- **Quality of previous undergraduate and graduate work**. The Graduate School requires as a minimum standard an average of 3.0 on a 4.0 scale in all undergraduate courses taken at a regionally accredited college or university. Adequate performance in prerequisite courses is required. Applicants with international credentials must submit in the original language those academic records that are not written in English. Such credentials must be accompanied by a literal English translation. Both must be submitted by the published international application submission deadline for the degree or certificate program. Original copies must be submitted to the Graduate School before the completion of the first term (semester or 12-week term) of enrollment.
- **Strength of letters of recommendation from persons competent to judge the applicant's probable success in graduate school**. These letters are usually from the applicant's former professors who are able to give an in-depth evaluation of the applicant's strengths and weaknesses with respect to academic work. Additional recommendations may come from employers or supervisors who are familiar with the applicant's work experience.
- **Scores on a nationally standardized examination**. The three most widely used standardized examinations are the Graduate Record Examination (GRE), the Graduate Management Admissions Test (GMAT) and the Miller Analogies Test (MAT). Because the predictive utility of these test scores may vary from one group of applicants to another, a discriminating use of all relevant materials will be made in each applicant's case. The TOEFL, IELTS Academic, or PTE Academic are required of international applicants who are not native speakers of English.
- **Applicant's statement of his or her academic career objectives and their relation to the intended program of study**. These statements help the program to identify students whose goals are consonant with the program's objectives and expertise.
- **Other evidence of potential success in graduate studies**. Some programs require other evidence of potential for success in graduate study, such as a portfolio of creative work, completion of specialized examinations, personal interviews, or an example of scholarly work.
- **Availability of an advisor in the applicant's specific field, available space in the program, and competitive rating within the applicant pool for the given term of entry.**

  Prospective students may apply for admission to the University of Maryland during or after their final year of undergraduate study but must furnish proof of graduation before the end of their first term (semester or 12-week term) of enrollment at the University. Students applying for admission to a graduate degree program in a field of specialization in which they already hold that same degree or its equivalent may do so only if the previous degree program was of substantially different character or was not accredited. Summer-only students applying for entrance in either of the two summer sessions should check the Summer Sessions Bulletin to determine if the courses they wish to take will be offered. To obtain this publication, write to the

University of Maryland
Office of Extended Studies
Suite 0132
Main Administration Building,
7901 Regents Drive,
College Park, MD 20742

This information may also be accessed online at https://oes.umd.edu/incoming-current-visiting-students/summer-session

The Admission Process

To be considered for admission to the Graduate School, each applicant must follow the Graduate School application procedures, currently available at http://gradschool.umd.edu/admissions/application-process/step-step-guide-applying. The process requires the following:

- Completion of the University of Maryland Graduate Application (online);
- Payment of the non-refundable application fee;
- Submission of all relevant transcripts and supplementary application materials;
- Fulfillment of all graduate program admissions requirements;
- Adherence to published application deadlines.

Admissions Records and Disposition

All records, including both standardized test scores and academic records from other institutions, become part of the official file and can neither be returned nor duplicated for any purpose. Students should retain an additional copy of their official credentials to keep in their possession for advisory purposes and for other personal requirements.

The admission credentials and the application data of applicants are retained from the date of receipt for 12 months only and then destroyed in the following cases:

1) Applicants who do not register for courses at the time for which they have been admitted;

2) Applicants whose applications have been disapproved;

3) Applicants who do not respond to graduate program requests for additional information; and

4) Applicants whose applications are not complete with respect to the inclusion of all transcripts or test results.

Admission to Degree Programs

Graduate students are admitted to a particular program for a specific degree objective (M.A., Ph.D., Ed.D, etc.). With the exception of established dual degree programs, joint-degree programs, and certificate programs, graduate students are permitted to matriculate into only one graduate degree program at a time. Graduate students are admitted to either full or conditional status as outlined below:

Full Graduate Student Status

Students may be admitted to full graduate status if they have submitted official documents indicating a completed baccalaureate degree from a regionally accredited institution or have earned a degree equivalent to a baccalaureate degree from another country, and are fully qualified in the judgment of the individual program and the Graduate School.

Conditional Graduate Student Status

Students may be admitted to conditional status if:

- The previous academic record is not outstanding; **or**
- The prerequisite coursework in the chosen field is insufficient; **or**
- The applicant has majored in another field with a creditable record but has not yet clearly demonstrated abilities in the proposed new field; **or**
- The applicant needs to fulfill an English remediation requirement; **or**
- The applicant has not provided official verification of information required by the graduate program or the Graduate School, such as the last semester's work or receipt of a degree.

  Official transcripts indicating receipt of the degree must be submitted before the end of the first term of enrollment (semester or 12-week term). Registration for a second term (semester or 12-week) will not be permitted unless these documents are received by the Graduate School.

Offer of Admission

All completed applications will be reviewed by the Graduate School and the graduate program to which the applicant applied. Applicants may receive correspondence from each of these offices requesting clarification or additional information or documents. Responses should be directed to the inquiring office directly.

Formal admission to The University of Maryland is offered only by the Graduate School. Applicants admitted to the Graduate School will receive a written offer of admission from the Dean of the Graduate School. To accept or decline the offer, applicants must notify the Graduate School by the first day of classes of the term (semester or 12-week term) for which the applicant was accepted or the offer becomes void. Immediately following written acceptance, applicants should contact the graduate program for registration information. Applicants are allowed a one-time only deferral of the admission of up to one year, subject to approval by the graduate program. Applicants who are unsuccessful in gaining admission to a graduate program are also notified in writing by the Graduate School.

Admission Term Changes

The Offer of Admission is extended to the applicant only for a specified term (semester or 12-week term). If an admitted student or a Graduate Program wishes to change the term of entry (semester or 12-week term), they must petition the Graduate School in writing. The Graduate School will allow one (1) term (semester or 12-week term) change requested by the program, and one (1) requested by the admitted student, contingent upon the approval of the program's Director of Graduate Studies. Any further changes will require a new application to the Graduate School.

Non-Degree Admission: Non-Degree Seeking Student Status

Although the primary mission of the Graduate School is to conduct programs of graduate instruction leading to advanced degrees, the Graduate Faculty will admit qualified students without degree objectives as Non-Degree Seeking Students, to the extent that resources allow. Unofficial transcripts or photocopies of diplomas will be accepted with the application for evaluation purposes, but the student must submit official copies of all required documents before the end of the first term of enrollment (semester or 12-week term). Official transcripts must be submitted from all institutions except the University of Maryland, College Park.

The Non-Degree Seeking Student status is not available to international students who would require the University of Maryland to sponsor them on an F-1 student visa.

Applicants for admission to Non-Degree Seeking Student status must hold a baccalaureate degree from a regionally accredited institution, with a cumulative 3.0 grade point average, and:

- Submit official transcripts covering all credits used in satisfying the baccalaureate degree requirements, **or**
- If the applicant holds a master's or doctoral degree from a regionally accredited institution, submit an official transcript showing the award of a master's or doctoral degree, **or**
- Achieve a score that places the applicant in the upper 50th percentile of appropriate national standardized aptitude examinations, including the Graduate Record Examination, the Miller Analogies Test, and the Graduate Management Admissions Test (where different percentiles are possible, the Graduate School will determine which score is acceptable), **or**
- Provide a strong letter of support from the Graduate Director of the program in which the applicant plans to take a course.

  Admission to Non-Degree Seeking Student status will continue for five years. If there is no registration in two consecutive academic terms (semesters -Fall and Spring or 12-week term), the admitted status will lapse and a new application will be required.

  Non-Degree Seeking Students must maintain a 3.0 grade point average. Non-Degree Seeking Students whose grade point average falls below 3.0 will not be permitted to register.

  Non-Degree Seeking Students must pay all standard graduate fees. Students in this status are not eligible to hold appointments as Graduate Teaching or Research Assistants or Fellows, or to receive other forms of financial aid. All other services available to them (e.g., parking, library privileges) are the same as those accorded to other graduate students.

  Successful completion of courses taken as a Non-Degree Seeking Student does not guarantee admission to a graduate degree or certificate program. Each program may accept such courses in satisfaction of program requirements to a maximum of nine (9) credits, contingent on admission to the degree or certificate program and on the approval of the faculty in the program. For consideration of admission to a degree program at a later time, the student must submit a new application. (For those admitted as an Advanced Special Student prior to the Fall 2017 term, each program may accept such courses in satisfaction of program requirements to a maximum of twelve (12) credits, contingent on admission to the degree or certificate program and on the approval of the faculty in the program.)

Visiting Graduate Student Status

A graduate student matriculated in another graduate school who wishes to enroll in the Graduate School of the University of Maryland and who intends to return to the graduate school in which he or she is matriculated, may be admitted as a Visiting Graduate Student.

To apply, the applicant must submit a completed application (http://gradschool.umd.edu/admissions/application-process/step-step-guide-applying) and pay the current application fee. Transcripts, letters of recommendation, and test scores are not required. In lieu of transcripts, the applicant must submit a letter from the Graduate Dean at the applicant's institution confirming that the applicant is in good academic standing and that courses taken at the University of Maryland will be transferred to the home institution.

Golden Identification Card for Senior Citizens of Maryland

The University's services and courses are available without charge to citizens who are residents of the State of Maryland, 60 years of age or older, and retired (retired persons will be considered those who affirm that they are not engaged in gainful employment for more than 20 hours per week). Individuals who meet these requirements may apply for graduate admission, either as degree-seeking or non-degree-seeking students, and must meet all admissions criteria. Once admitted and issued the Golden Identification Card, senior citizens may register for courses in any session on a space-available basis, and may use the library and other University facilities during the time they are enrolled in courses. Tuition will be waived for Golden Identification Card holders, but mandatory fees must be paid. Golden ID Card holders may register during the first week of classes for up to 3 courses; they may not pre-register. Please refer to the *Registration Guide* for more information on the Golden ID registration procedures.

Change of Status or Program

Students are admitted with a particular status to a specified program for a specified objective. A new application is required if:

- The student wishes to change programs (students may be admitted to only one graduate program at any one time); **or**
- The student wishes to change status (from non-degree to degree); **or**
- The student wishes to pursue a new degree objective (e.g., change from master's to doctoral degree).
- Admission to a new program and/or status is not granted automatically. Each application is subject to review and approval.

Admission of Members of the Faculty

No member of the faculty who is employed by the University of Maryland with the position of assistant professor or higher is permitted to enroll in a program leading to an advanced degree in his or her academic college or school. A faculty member who wishes to take course work for personal enrichment in his or her academic college or school may choose to investigate the Non-Degree Seeking Student status. A faculty member who wishes to pursue an advanced degree in a graduate program outside his or her academic college or school may do so by obtaining written consent from the Deans of both the academic college/school in which he or she is employed and that from which he or she seeks a degree, and, subsequently, from the Dean of the Graduate School.

Admission to An Institute

Application for admission to an institute should be made directly to the director of the institute. If admission to the Graduate School is also necessary, the decision will be based on the same criteria for admitting other degree applicants. Admission to an institute does not imply that the individual will be automatically admitted in any other status at the University of Maryland at a later date. The status terminates upon completion of the institute in which the student is enrolled. A new application and fee must be submitted for admission to any other graduate status or program.

Students already admitted to a regular graduate degree or non-degree status may also qualify for participation in an institute.

Immunization

The University of Maryland requires all freshmen, new graduate students, and transfer students to provide documentation of measles, mumps, rubella, and tetanus / diphtheria immunizations. It is a student's responsibility to provide this information to the Health Center before school begins. This requirement will not be waived.

Residency Classification

Petitions, related documents and questions concerning the Board of Regents Policy on Student Classification for Admission and Tuition Purposes should be directed to the Residency Reclassification Services (http://www.registrar.umd.edu/resreclass.html) in the Office of the Registrar.

Determination of In-State Status for Admission and Tuition Purposes: See www.usmh.usmd.edu/regents/bylaws/SectionVIII/VIII270.html (http://www.usmh.usmd.edu/regents/bylaws/SectionVIII/VIII270.html) **for the complete text of this policy.**

An initial determination of in-state status will be made by the Graduate School at the time a students' application for admission is considered. The determination made at that time, and any determination made thereafter, shall prevail in each term (semester or 12-week term) until the determination is successfully challenged. Students may challenge their classification by submitting a timely petition to the Residency Reclassification Services. Determinations are based on the residency policy and requirements. The deadline for submitting a complete petition along with all supporting documents, is the first day of the term (semester or 12-week) in which the student wishes to be classified as in-state.

The volume of requests for reclassification may necessitate a delay in completing the review process. A decision in each case will be made within 60 days of receipt of a complete petition and all required documentation. During this period of time, or any further period of time required by the university, any fees and charges based on the previous determination must be paid. The student is solely responsible for any late charges incurred by the residency process. If the determination is changed, any excess fees and charges will be refunded.

Students classified as in-state for admission and tuition purposes are responsible for notifying the Residency Reclassification Services in writing within 15 days of any change in their circumstances that might in any way affect their classification at the University of Maryland.

For more information, refer to the Residency Classification Services (http://www.registrar.umd.edu/resreclass.html) web page.

Registration Policies

Registration and Credit Information

To attend classes at the University of Maryland, College Park, it is necessary to process an official registration. Specific registration dates and instructions are printed in the Registration Guide and on the MyUM website, www.my.umd.edu. Registration information for Summer Session, Winter Session, and Professional Graduate Programs administered by the Office of Extended Studies may be found at www.oes.umd.edu.

Designation of Full-Time and Part-Time Status

The Graduate School uses a unit system in making calculations to determine full-time or part-time student status. Please note that graduate units are different from credit hours. The number of graduate units per credit hour is calculated in the following manner:

- Courses in the series: 000-399 carry 2 units per credit hour.
- Courses in the series: 400-499 carry 4 units per credit hour.
- Courses in the series: 500-599 carry 5 units per credit hour.
- Courses in the series: 600-897 carry 6 units per credit hour.
- Master's Research course: 799 carries 12 units per credit hour.
- HESP829 course carries 18 units per credit hour.
- Pre-candidacy Doctoral Research courses: 898 carries 18 units per credit hour.
- Doctoral Dissertation Research: 899 carries 18 units per credit hour. All doctoral candidates must pay candidacy tuition for which they will be registered for six (6) credit hours of 899; this defines all currently registered doctoral candidates as full-time.

For programs on the semester term, to be certified as full time, a graduate student must be officially registered for a combination of courses equivalent to 48 units per semester. Graduate assistants holding regular appointments have full-time status if they are registered for at least 24 units in addition to the assistantship; holders of half-time assistantships are considered full-time if registered for 36 units. Audited courses do not generate graduate units and cannot be used in calculating full-time or part-time status.

For programs on the 12-week term, to be certified as full time, a graduate student must be officially registered for a combination of courses equivalent to 36 units per 12-week term. Graduate assistants holding regular appointments have full-time status if they are registered for at least 18 units in addition to the assistantship; holders of half-time assistantships are considered full-time if registered for 27 units. Audited courses do not generate graduate units and cannot be used in calculating full-time or part-time status.

Course Numbering System

Courses are designated as follows:

- 000-099: Non-credit courses
- 100-199: Primarily first-year courses (not acceptable for credit toward graduate degrees).
- 200-299: Primarily sophomore courses (not acceptable for credit toward graduate degrees).
- 300-399: Junior and senior courses (not acceptable for credit toward graduate degrees).
- 400-499: Junior and senior courses acceptable for credit toward some graduate degrees. The number of such credits is limited by policies of the Graduate School and by the graduate program.
- 500-599: Professional school courses (Dentistry, Law, Medicine) and post-baccalaureate courses not for graduate degree credit.
- 600-898: Courses restricted to graduate students (see above for exceptions).
- 799: Master's thesis credit.
- 899: Doctoral dissertation credit.

The first character of the numeric position of the course number determines the level of the course and the last two digits are used for course identification. Courses ending with the numeral 8 or 9 are the only courses that are repeatable for credit.

Continuous Registration Requirements

All graduate students must register for courses and pay associated tuition and fees each term (semester or 12-week term), not including summer and winter sessions for semester-based programs, until the degree is awarded.

A student who fails to register and who has not requested and received a waiver of registration or "Leave of Absence for Childbearing, Adoption, Illness or Dependent Care" will be notified by the Graduate School after the first day of classes that he or she must register for the current term (semester or 12-week term). The Graduate School will also inform the Graduate Director of the graduate program that the student is in jeopardy of termination. If the student does not register, he or she will be dismissed from the Graduate School at the end of the term (semester or 12-week term) for failure to comply with the continuous registration requirement.

A student who is dismissed for non-registration may appeal dismissal during a 30-day period following the end of the semester or during a 10-day period following the end of a 12-week term of non-registration. If the student does not appeal, or if the appeal is denied, and the student wishes to continue in the Graduate School, the student must apply for readmission. In this case, readmission does not alter the initial requirements for time to complete the degree or advance to candidacy.

Waiver of Registration for Certificate, Master's, and Pre-Candidacy Doctoral Students

Certificate, Master's, and pre-candidacy Doctoral students who will be away from the University for a term (semester or 12-week term) or for two terms (a year on the semester system or two 12-week terms) may request a waiver of continuous registration and its associated tuition for the term(s) granted. Waivers of registration will be granted only if the student is making satisfactory progress toward the degree and can complete the degree requirements within the required time limits. Interruption of registration cannot be used to justify a time extension.

Permission for non-registration is obtained from the Graduate Director of the student's program and the waiver must be filed with the Graduate School. Students who are not registered may not use any University facilities, including the library, and should expect to consult with members of the Graduate Faculty seldom or not at all.

A request for a waiver of registration should be filed 30 days before the beginning of the term (semester or 12-week term) for which the waiver is sought. Tuition waiver requests will be granted only when the student affirms in writing that he or she will not be using any University resources, including the time of faculty members, during the waiver period.

Waiver of Registration for Doctoral Candidates

Doctoral Candidates are not eligible for Waivers of Continuous Registration. Each doctoral Candidate must maintain continuous registration in 899 (Doctoral Dissertation Research) until the degree is awarded. Waivers of Registration may be granted only under the University's policy for Leave of Absence for Graduate Students for Childbearing, Adoption, Illness or Dependent Care (see below).

Waiver of Mandatory Fees

A waiver of Mandatory Fees may be granted to any graduate student, including Doctoral Candidates, if the registered student will be away from the University for a term (semester or 12-week). An application for waiver of Mandatory Fees must be submitted to the Graduate School 30 days before the beginning of the term (semester or 12-week) for which the waiver is sought.

Leave of Absence for Childbearing, Adoption, Illness or Dependent Care

In recognition of the effects that childbirth, adoption, illness, and caring for incapacitated dependents (such as children, ill or injured partners, or aging parents) may have on the time and energy that graduate students have to devote to their educational programs, the University allows students in such circumstances to apply for a leave of absence of up to two semesters or up to three 12-week terms during which time they do not intend to make academic progress toward the completion of their degree. The time taken on an approved leave of absence is not included in the time limitations for degree completion and advancement to candidacy. For the Graduate Student Parental Accommodation Policy, which enables students to maintain full-time enrollment status rather than take a leave of absence, see the Parental Accommodation Policy. (p. 1061)

Length of Leaves

Application for a leave of absence may be made either on a one- or two-semester basis or on one- or two- or three 12-week term basis. A leave of absence ordinarily will not be granted for more than one academic year. Leaves requested for a longer period are approved only in exceptional circumstances. An approved leave for one semester will be extended to two semesters as needed or an approved leave for one 12-week term will be extended to two will be extended to three, if so requested by the applicant prior to the expiration of the approved one- term (semester or 12-week) leave of absence.

Application Procedures

A leave of absence for childbearing, adoption, illness, or dependent care normally must be requested and approved prior to the beginning of the academic term for which it is being requested. A letter of request should be addressed to the Dean of the Graduate School and should provide a detailed explanation of the circumstances leading to the request and a justification of the time requested. The request must be approved by the student's faculty advisor and Graduate Director prior to submission to the Graduate Dean. The faculty advisor, Graduate Director, and/or Graduate Dean may request a doctor's statement. Approved leaves will stop the student's "time-to-degree clock."

Special Considerations

- **Registration Requirements.** Students on approved leaves of absence are not registered at the University and, therefore, do not have the rights and privileges of registered students. Students must be registered during a term (semester or 12-week) in which they fulfill a University or departmental degree requirement, such as taking qualifying exams or submitting a dissertation/thesis. In addition, students must also be registered in order to be eligible for any form of University financial aid (e.g., a teaching or research assistantship) and to be certified as full-time students.

- **Impact on Funding.** When contemplating a leave of absence, graduate students are advised to consult with the sources of their funding to determine whether a leave might involve a long-term financial loss. Because academic programs and financial aid packages may be constructed and sequenced over a period of years, individual interruptions to the normal sequence of academic progress and scheduled employment may result in a loss of future funding and a slower time to completion of degree. In some programs, a leave of absence may mean that students may have to join a new project upon return, with the likelihood that their research may take longer to complete. Whenever a leave of absence is being considered, a student should meet with the advisor to develop a plan for resumption of study and gain a clear understanding of future funding opportunities. Some outside funding agencies frown on interruptions to a degree program. Some only allow leaves for medical reasons or military service. Others require prior approval of the fellowship agency.
- **Students with outstanding educational loans** need to consider the effect of taking a leave of absence on their loan status. For some student loans, a grace period for repaying the loan begins once the student stops registering. If the leave period is longer than the grace period, then the student may have to begin repaying the loan while on a leave of absence. Prior to taking a leave, students should arrange to meet with a Student Financial Aid officer, and/or contact their lenders.
- **International students.** Non-immigrant F-1 and J-1 students and their dependents must maintain legal immigration status at all times. Students with F-1 or J-1 visas must be enrolled full-time every term (semester or 12-week) at the University while they remain in the United States. The only possible exception that might allow a student to remain in the United States while on an approved leave of absence might be a serious illness or medical condition. Students are advised to consult with International Student and Scholar Services (http://international.umd.edu/ies/97)for more information when considering a leave of absence.
- **Student Accounts.** Students are advised to check with Student Financial Services and Cashiering (https://billpay.umd.edu) prior to taking an approved leave of absence in order to determine the status of their student accounts. Students are advised that accounts that are overdue will be subject to regular procedures in accordance with University guidelines, notwithstanding any approved leave of absence: specifically, late fees and finance charges will continue to accrue, students will be blocked from future registration upon their return, and accounts will be referred to the State Central Collection Unit, with the imposition of additional collection charges, for non-payment in accordance with regular time frames.
- **University Housing.** The University's general policy is that students must be registered to be eligible for University housing. For specific information about continued eligibility for University housing during an approved leave of absence, students are advised to contact the Department of Resident Life. Additional restrictions may apply to students leasing housing through Southern Management Corporation. For specific information, students should contact the appropriate rental agent.
- **Access to University Resources.** Students who are on a leave of absence do not have a valid University of Maryland Identification card and therefore are not entitled to use University resources, such as the libraries, recreational centers, shuttle buses, and other services covered by mandatory fees. Students seeking information on the use of the libraries may find it at http://www.lib.umd.edu/access/access-privileges, or they may contact the McKeldin Library Circulation Department, Community Borrowers Office, Monday-Friday, 9:00 a.m. - 4:00 p.m.

LEAVE OF ABSENCE FOR MIlitary Service

Graduate students in the United States Armed Forces, including members of the National Guard or Reserve, may apply for a leave of absence to fulfill a voluntary or involuntary service commitment. Students may apply for a leave of absence of up to two semesters, during which time the requirement of continuous graduate registration is suspended.

LENGTH OF LEAVES

Application for a leave of absence may be made for one or two semesters. An approved leave for one semester may be extended to two semesters if requested by the applicant at least four weeks prior to the expiration of the approved one-semester leave of absence. Leaves of absence for more than two semesters will be considered on a case by case basis.

APPLICATION PROCEDURES

A leave of absence for military service must be requested and approved prior to the beginning of the academic term for which it is being requested. A letter of request should be addressed to the Dean of the Graduate School and should provide a detailed written explanation of the circumstances and a justification for the time requested (one or two semesters). The request must be approved by the student's faculty advisor and Graduate Director prior to submission to the Graduate Dean.Approved leaves will stop the student's "time-to-degree clock."

SPECIAL CONSIDERATIONS

- **Registration Requirements.** Students on approved leaves of absence are not registered at the University and, therefore, do not have the rights and privileges of registered students. Students must be registered during a term (semester or 12-week) in which they fulfill a University or departmental degree requirement, such as taking qualifying exams or submitting a dissertation/thesis. In addition, students must also be registered in order to be eligible for any form of University financial aid (e.g., a teaching or research assistantship) and to be certified as full-time students.
- **Impact on Funding.** When contemplating a leave of absence, graduate students are advised to consult with the sources of their funding to determine whether a leave might involve a long-term financial loss. Because academic programs and financial aid packages may be constructed and sequenced over a period of years, individual interruptions to the normal sequence of academic progress and scheduled employment may result in a loss of future funding and a slower time to completion of degree. In some programs, a leave of absence may mean that students may have to join a new project upon return, with the likelihood that their research may take longer to complete. Whenever a leave of absence is being considered, a student should meet with the advisor to develop a plan for resumption of study and gain a clear understanding of future funding opportunities. Some outside funding agencies frown on interruptions to a degree program. Some only allow leaves for medical reasons or military service. Others require prior approval of the fellowship agency.
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to meet with a Student Financial Aid officer, and/or contact their lenders.

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- **University Housing.** The University's general policy is that students must be registered to be eligible for University housing. For specific information about continued eligibility for University housing during an approved leave of absence, students are advised to contact the Department of Resident Life. Additional restrictions may apply to students leasing housing through Southern Management Corporation. For specific information, students should contact the appropriate rental agent.
- **Access to University Resources.** Students who are on a leave of absence do not have a valid University of Maryland Identification card and therefore are not entitled to use University resources, such as the libraries, recreational centers, shuttle buses, and other services covered by mandatory fees. Students seeking information on the use of the libraries may find it at http://www.lib.umd.edu/access/access-privileges, or they may contact the McKeldin Library Circulation Department, Community Borrowers Office, Monday-Friday, 9:00 a.m. - 4:00 p.m.

Academic Calendar

The academic calendar (https://www.provost.umd.edu/calendar) contains important information regarding registration. Graduate students preparing to graduate should refer to the Deadlines for Graduate Students (http://registrar.umd.edu/calendar.html).

Course and Credit Changes

A graduate student may drop a course, add a course, change between audit and credit status, change the number of credits for a course within the listed range, cancel registration, or withdraw from the University without special approval until the end of Schedule Adjustment Period. No credit level changes or grading option changes are permitted after the "Graduate Student Deadline To" date. The deadlines (http://www.registrar.umd.edu/calendar.html) are published each term on the Registrar's website; the procedures governing each of these transactions are listed below. Drop/Add and other changes may be done in person at the Office of the Registrar or online at http://www.testudo.umd.edu. **Full refunds are not available for reductions in total credits after the first day of classes.** For more information, please see the Refunds section of this Catalog. (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?tuition-and-fees)

Exceptions to the published deadlines require a petition to the Graduate School which must include the written approval of the instructor and the Graduate Director of the program. Petitions should be submitted to the Graduate School, 2123 Lee Building. The graduate program stamp must be placed on the change of grading option/credit level form.

Withdrawal from Classes

The term "withdrawal" means termination of enrollment in all classes for a given term (semester or 12-week). The date of the withdrawal is indicated on a graduate student's academic record. To withdraw from a term (semester or 12-week) on or before the last day of classes a graduate student must notify the Office of the Registrar, 1113 Mitchell Building, in writing or in person. Withdrawal becomes effective on the date notification is received in the Records Office. The University Refund Policy applies to withdrawals after the first day of classes. Students who withdraw may be in violation of the University's continuous registration requirement, unless they have received a waiver of registration from the Graduate School.

If the time limitation in a master's or pre-candidacy student's program has not lapsed (5 years to obtain a master's degree and 5 years to reach doctoral candidacy), the graduate student is eligible to re-enroll without readmission provided he or she has received a waiver of registration from the graduate program or has received an approved Leave of Absence from the Graduate School; withdrawal by a doctoral candidate without an approved Leave of Absence or Waiver of Registration will officially end the student's status as a graduate student.

Resignation from the University

A graduate student wishing to withdraw from the University and terminate his or her graduate student standing may do so by submitting a letter to the Graduate School. The Graduate School will then cancel the student's admission status, effective the date the letter is received. If the student is registered for classes at the time of his or her resignation, the Graduate School will ask the Office of the Registrar to withdraw the student effective the date of the resignation. The University Refund Policy applies for resignation after the first day of classes. A graduate student seeking to return to the University of Maryland after resigning must reapply for admission and is subject to all graduate program and Graduate School requirements. He or she may be required to repeat previously elected courses (see time limits for relevant degree or certificate programs).

Grading Systems

The University's A through F grading system is used in graduate level courses. A "Satisfactory or Failure" (S-F) grading system may be used for certain types of graduate study at the discretion of the graduate program. These include courses that require independent fieldwork, special projects, or independent study. Graduate program seminars, workshops, and graduate program courses in instructional methods may also be appropriate for the S-F grading system. The "Pass-Fail" grading system is not available for graduate students. However, a graduate program may allow, in certain cases, a graduate student to use the Pass-Fail option for 100-300 level courses. Graduate credit may not be earned for these courses. Either the A-F or the S-F grading system may be used for master's thesis (799), and pre-candidacy (898) and doctoral dissertation (899) research, as well as for courses labeled "Independent Study" or "Special Problems." Only one grading system may be used per course in a particular term (semester or 12-week) except for thesis and dissertation credits. The grading system will be designated by the student's graduate program or the graduate program offering the course.

Graduate Credit for Undergraduates

An undergraduate degree-seeking student at the University of Maryland may register for graduate-level courses (600-897) with the approval of the Dean of his or her academic college, the chair of the department,

the instructor offering the course, and the Dean of the Graduate School. These courses will be recorded as "for graduate credit only" and may ONLY be applied toward an advanced degree at this university or elsewhere. Students eligible for this option must have achieved Junior standing, will have a GPA of at least 3.0, and will have successfully completed the prerequisite courses with a grade of "B-" or better. The student must submit a plan of study showing that taking graduate courses will not unduly delay completion of the requirements for the bachelor's degree. The total of graduate and undergraduate credits attempted in any semester may not be more than eighteen. The graduate credits so earned will not count toward any requirements for the bachelor's degree. An undergraduate student may take a maximum of 12 graduate credits whether taken as graduate credits only or as graduate credits as part of a dual bachelors/masters program. Courses in a 12-week term program are not open to undergraduate students.

Undergraduate Credit for Graduate Courses

Subject to requirements determined by the Graduate Faculty of the department or program offering the course, undergraduate degree-seeking students may register for graduate-level courses, (those numbered from 600 to 897) with the exception of 799, for undergraduate credit. The student must obtain the prior approval of the department and instructor offering the course.

Enrollment in a graduate-level course does not in any way imply subsequent departmental or Graduate School approval for admission into a graduate program. The course may not be used as credit for a graduate degree at the University of Maryland except as part of an approved Bachelor's/Master's program into which the student has been admitted. Courses in 12-week programs are not open to undergraduate students.

Partial Credit for Students With Disabilities

The Graduate School recognizes that students with documented disabilities may be prevented from participating courses that include laboratories, studio work, or other non- classroom activities in which the student is prevented from participating because of the disability. Therefore, it is the Graduate School 's policy to allow students with disabilities to enroll in such courses, complete only those parts of the course that their capabilities permit, and receive credit for the course proportionate to their levels of participation. Students with disabilities should contact Disability Support Services (DSS) for information and assistance with any disability-related issue. Phone (301) 314-7682 (V/TTY). Graduate students with disabilities who wish to enroll under this policy should consult the Graduate School. The Dean, in consultation with DSS, will assist the student in making the necessary arrangements with the graduate program offering the course, the graduate program in which the student is enrolled, and the Office of Registrar. The final agreement as to the student's level of participation and the amount of credit to be awarded will be specified in an agreement to be drawn up by the Dean of the Graduate School and signed by all parties concerned.

Inter-Institutional Registration, University System of Maryland

A student admitted to the Graduate School in any institution of the University System of Maryland is eligible to take courses at any other institution of the University System of Maryland subject to the approval of the Graduate Directors and the Graduate Deans of the home and host institutions. Credits earned at a host institution are considered resident credit at the home institution, and, following normal procedures for graduate program approval, these credits may be used to meet University of Maryland graduation requirements. Transcripts of courses taken at another institution will be maintained at the home institution and fees will be paid to the home institution. Forms for registration as an inter-institutional student may be obtained from the Office of the Registrar. For more information, refer to Inter-Institutional Enrollment (http://www.registrar.umd.edu/current/registration/inter-institutional.html).

The Washington Consortium Arrangement

The University of Maryland is a member of the Consortium of Universities of the Washington Metropolitan Area (http://www.consortium.org). Other institutions currently associated with the consortium include American University, The Catholic University of America, the University of the District of Columbia, Gallaudet University, George Mason University, Georgetown University, George Washington University, Howard University, Marymount University, Trinity University, the National Defense University, The Joint Military Intelligence College, and Southeastern University. Students enrolled in any one of these institutions are able to attend certain classes at the other institutions and have the credit considered "residence" credits at their own institutions. Grades in these courses are calculated into the student's GPA. Tuition remission awarded to graduate assistants and fellows may be used to pay for courses at other consortium universities. Students from schools in the Consortium of Universities of the Washington Metropolitan Area may register for University of Maryland courses on a space-available basis beginning with the first day of classes.

The policies governing registration through the Consortium Arrangement are listed below.

- Courses for majors in graduate programs at the University of Maryland that have restricted enrollment will not be available to students from other consortium schools. Similar rules may apply at other consortium universities.
- Students from consortium schools are expected to meet all prerequisites for University of Maryland courses for which they wish to enroll. Similar rules may apply at other consortium universities.
- Students from consortium schools will not be permitted to register for practica, workshops, internships, and other experiential courses at the University of Maryland . Similar rules may apply at other consortium universities.
- Students from consortium schools who have previously applied for admission to a University of Maryland graduate degree program and have been denied admission will be permitted to register for graduate courses in that program only with the specific approval of the Director of Graduate Studies of the program.
- Students from consortium schools who have been dismissed from the University of Maryland for disciplinary or financial reasons will not be permitted to enroll in courses at the University of Maryland under the consortium arrangement.
- Graduate assistants and fellows can use tuition remission provided by the University of Maryland to pay for courses at other consortium universities.

For more information, refer to the D.C. Consortium Enrollment (http://www.registrar.umd.edu/current/registration/consortium.html).

Tuition, Fees, and Expenses

Payment of Tuition and Fees

Tuition rates and fees are posted on the University's web site at https://billpay.umd.edu/billing-tuition-and-fees/graduate-tuition-and-fees

Tuition, fees, and other University charges may be paid by mail, online (https://billpay.umd.edu/payments/payment-overview) or in person at 1135 Lee Building, 8:30 a.m.- 4:30 p.m., Monday through Friday. The University accepts checks and Visa, MasterCard, American Express, and Discover cards for payment. Checks should be made payable to "The University of Maryland." Students can also obtain their account balances through Student (https://billpay.umd.edu)Financial Services and Cashiering (https://billpay.umd.edu).

It is the policy of the University not to allow deferment of payment pending the result of an application for financial assistance to an outside agency, including Veterans Administration benefits, bank loans, or guaranteed student loan programs.

Each student is individually responsible for his or her bill and for meeting payment deadlines. Failure to meet these deadlines may result in late charges or cancellation of registration. The University will suspend services to students for delinquent indebtedness and failure to pay bills. The University will also transfer delinquent accounts to the State Central Collections Unit, which will levy further late fees and take necessary steps to obtain payment.

Forms of Financial Aid

The Office of Student Financial Aid administers a number of programs to assist graduate students (e.g. loans and federal work study). Please see http://www.financialaid.umd.edu for more information.

Emergency Loans

Students may receive up to $500 as an interest-free loan that must be repaid in 60 days. If the loan is not repaid within 60 days, the amount will be charged against the student's account and late fees may be incurred. These loans are available from the Office of Student Financial Aid, 1135 Lee Building . Applicants should bring documentation of their need. They will then be asked to complete a short loan application form. They will subsequently meet briefly with a loan counselor who will review their need. The loan counselor will either approve or deny funds.

University Refund Statement

Tuition, fees, and refundable deposits are authorized for refund only if the student completes the prescribed withdrawal procedures or is dismissed from the University. Residence Hall and Dining Services charges are authorized for refund only if the student completes the prescribed residence hall and dining services contract release procedures. Please refer to the current Academic Deadlines (http://www.registrar.umd.edu/calendar.html) for complete refund information and procedures.

Refunds for Withdrawal from All Classes

A Cancellation of Registration submitted to the Office of the Registrar **before** the first day of classes entitles the student to a full credit or refund of term (semester or 12-week) tuition and fees.

After classes begin, students who wish to terminate their registration and withdraw from all classes must follow the withdrawal procedures specified in the *Registration Guide*. Students will find the necessary forms for withdrawal in 1113 Clarence M. Mitchell Jr. Building. The effective date used in computing refunds is the date the withdrawal form is filed with the Office of the Registrar. Stopping payment on a check, failure to pay the term (semester or 12-week) bill, or failure to attend classes does not constitute withdrawal.

Students withdrawing from the University will be credited for tuition in accordance with the following schedule:

Period from data instruction begins	Refundable tuition*
Two weeks or less	80%
Two to three weeks	60%
Three to four weeks	40%
Four to five weeks	20%
Over five weeks	no refund

[1] Fees are non-refundable after the first day of classes.

Withdrawal from all classes may be a violation of the Graduate School's Continuous Registration policy. Students withdrawing from classes who intend to continue in their graduate degree or certificate program should secure a Waiver of Continuous Registration or Leave of Absence from the Graduate School before withdrawing.

Refunds for Dropping Individual Courses

Graduate students may obtain refunds for courses that are dropped during the Schedule Adjustment Period. Students may drop and add courses without penalty provided that the changes are made on the same day and that the total number of credits does not change. Graduate students are charged by the credit hour. A percentage charge and/or complete charge will be imposed according to the schedule below:

Withdrawal	Refund
Prior to the first day of classes - no charge	100% refund
During the Schedule Adjustment Period - 20% charge	80% refund
After the Schedule Adjustment Period - 100% charge	0% refund

For funds to be returned, students must file a request for a refund with Student Financial Services and Cashiering. If a request for refund is not filed, credit on the student account will automatically be carried over to the next term (semester or 12-week). Refund requests may be made by addressing a letter to Student Financial Services and Cashiering, Lee Building, University of Maryland, College Park, 20742, visiting the Student Financial Service Center, Lee Building, Room 1135, between 8:30 am to 4:30 pm, Monday-Friday, or requesting a refund online through Student Financial Services and Cashiering. (https://billpay.umd.edu) A credit balance is not automatically refunded.

Fellowships, Assistantships, and Financial Assistance

The University of Maryland recognizes the high cost of education today and makes every effort to offer financial assistance to qualified students through a variety of programs. Approximately seventy percent (70%) of all full-time graduate students receive financial support, which may include remission of tuition, teaching and research assistantships, work-study support, and University and other fellowships. Referrals for University or area employment opportunities for students and students' spouses

are also available in various graduate programs and in specific student service centers at the University.

Admission to a graduate degree program is a prerequisite for the award of a teaching or research assistantship, a fellowship, a traineeship, a loan, or a work-study award.

Graduate Fellowships

Graduate Fellowships are funded by the Graduate School through grants allocated to the academic colleges specifically for this purpose. Applicants and current students must apply directly to their Graduate Programs for fellowship funding. The Graduate School offers a limited number of dissertation fellowships. Applications are solicited annually. More information may be obtained from the Graduate School, http://gradschool.umd.edu/funding/fellowship-information. For more information, also please see the Fellowships (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?fellowships-policies)chapter of this Catalog.

Graduate Assistantships

A graduate assistantship is an academic appointment not involving academic tenure. Such assistantships take the form of teachings assistantships, research assistantships or, in a few cases, administrative assistantships. Offers of these positions are made to graduate students directly by the programs and departments.

The assigned duties of a graduate assistant are consistent with the aims and objectives of the teaching and research missions of the University. An appointment of 20 hours per week is considered a full-time assistantship. An appointment of 10 hours per week is considered a half-time assistantship. The responsibilities assigned to a graduate assistant should take into account what may be reasonably expected given the graduate assistant's education and experience.

For more information, please see the Assistantships (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?assistantship-policies) chapter of this Catalog.

Overload Payments for Graduate Students

Under certain circumstances, fellows and graduate assistants may be offered employment in addition to their normal appointments. As outlined in Chapter 15: Graduate Assistants and Chapter 16: Graduate Fellows , approval for such overload payments must be obtained from the Graduate School in advance of the appointment. The required request form can be found at https://gradschool.umd.edu/forms

Travel Grants

The Graduate School administers the Jacob K. Goldhaber travel grants for graduate students. Goldhaber grants are available to support part of the cost of attending conferences at which graduate students will present the results of their research. Because funding is limited, students are urged to apply as soon as their presentations have been accepted. More information is available at https://gradschool.umd.edu/funding.

Policies for Graduate Assistantships

General Policies

Graduate Assistants (GAs) are, first and foremost, graduate students pursuing an education. The opportunity to work closely with faculty members and undergraduate students in teaching, research, or administrative environments is an integral part of that education.

Graduate students who hold assistantships benefit educationally and professionally. They gain further expertise in their field; enhance their research skills and develop pedagogical skills; acquire experience in leadership, interpersonal effectiveness, and performance evaluation; acquire academic administrative experience; and enjoy collegial collaborations with advisors that may result in joint publications and other professional activities. Skills learned in assistantships prepare students not only for the academy, but also for corporate, government, and nonprofit organizations.

Assistantships also provide graduate students with the financial resources necessary to pursue their degrees. This financial support —stipend, tuition remission, and benefits—is part of the University's commitment to the success of our graduate students.

The University is committed to ensuring that graduate assistant assignments are productive, enhance student qualifications, meet funding support and workload goals, and are consistent with the educational objectives of the student and his or her program.

Categories

The official title of Graduate Assistant (GA) is used in all university documents, but, in general practice, Graduate Assistants are referred to either as Graduate Teaching Assistants (TAs), Graduate Research Assistants (RAs), or Graduate Administrative Assistants (AAs). Additionally, a small number of Graduate Assistants serve as resident life counselors. Qualified graduate students often move between these kinds of appointments during their graduate education.

Administration

Graduate Assistants at the University of Maryland, College Park are under the direct supervision of the department, program, or unit that offers the appointment. The department determines the GA's assignment, supervises his or her work, and recommends him or her for reappointment and promotion to various stipend or compensation levels. The department is the primary source of information for the details of the assistantship. Within the department, the GA's work assignment is determined by the Department Chair, the Director of Graduate Studies, any duly appointed executive committees and assistants to the chair, and/or the faculty member assigned to supervise the GA's particular course, laboratory session, or research project. Graduate Administrative Assistants are under the supervision of the heads of the academic or non-academic units in which they work.

Student Status

A Graduate Assistant is on an academic appointment not involving academic tenure. The appointment may be full-time (20 hours per week) or half-time (10 hours per week).
GAs holding regular 20-hour appointments are considered full-time students by the University if they are registered for at least 24 units in a semester term or 18 units in a 12-week term program.
GAs who hold half-time (10 hour) assistantships are considered full-time students if they are registered for 36 units in a semester term or 27 in a 12-week term program.
Audited courses do not generate units and cannot be used in calculating registration status. Individual departments or graduate programs may have higher registration requirements for their GAs.

For more information about unit requirements, please view the Registration Policies. (p. 1041)

Qualifications

A Graduate Assistant must be a registered graduate student in good standing enrolled in a degree program at the University of Maryland, College Park and must be making satisfactory progress toward the degree. Appointments are normally given to those students who have shown superior aptitude in their field of study and who appear likely to render a high quality of service to the university by their teaching or research activities or their administrative work in a unit. Non-Degree Seeking Students are not eligible to hold Graduate Assistantships.
In rare instances, an appointment of a Graduate Research Assistantship (RA) may be made for a graduate student who has been admitted into a graduate degree program at another campus within the University System of Maryland. In this exceptional case, the student will be supported by a Principal Investigator whose research contract or grant is administered by the College Park campus. The student's tuition, benefits, etc. will also be paid from research funds.

English Proficiency Requirements for International Students

International Teaching Assistants (ITAs) who are non-native speakers of English are required to undergo an evaluation of their spoken English abilities by the Maryland English Institute (MEI). The ITA Evaluation is not required of students who serve only as graders or researchers, or whose entire education has been in the U.S, United Kingdom, Ireland, English-speaking Canada, Australia, New Zealand, Anglophone Africa, or Commonwealth Caribbean. Students must pass the ITA Evaluation prior to being assigned teaching duties, including duties in labs. This requirement may not be waived.

The Graduate School pays the fee for the ITA Evaluation for students who have been formally appointed as TAs. All other students are responsible for paying this fee. If the department wishes to cover the cost of the evaluation for those students, the Graduate Director must indicate this in writing on the referral form.

Students who fail the ITA Evaluation are required to take an English course. On the basis of the evaluation results, MEI will place the student into either UMEI 006 (pronunciation) or UMEI 008 (broader communication patterns). If the student has been formally appointed as a TA, the department is responsible for the tuition of the course and may not pass the cost of this instruction on to the student. If the student fails the ITA evaluation and is not an ITA, the student is responsible for paying tuition for the course. Tuition remission cannot be used for UMEI courses.

Full details regarding the ITA Evaluation can be found on the Maryland English Institute website (http://marylandenglishinstitute.com/wpdir/english-programs/international-teaching-assistants).

Appointments

Appointment, Reappointment, Duration of Appointment

Most Graduate Assistants are appointed either for a regular academic year (9.5 months) or for 12 months. Some appointments may be for a shorter period. The academic-year appointment begins in mid-August and ends in May. Students may be reappointed one or more times at the discretion of the department in which they serve. To allow a larger number of qualified students to benefit from assistantships, many departments limit the number of years that a graduate student may serve as an assistant in any capacity.

Each department is responsible for determining and communicating its own specific criteria, within the limits of university policy, for assessing student qualification for appointment and reappointment to a graduate assistantship. In general, reappointment is dependent upon satisfactory performance and normal progress toward a graduate degree. As with all university faculty and staff positions, appointment and reappointment are contingent upon the availability of funds.

Letters of Appointment

It is the responsibility of the department to notify the graduate student in an official letter of the final offer of appointment. These letters provide information on the terms of the assistantship and should be explicit and clear with respect to workload expectations. A template can be found on the Graduate School's Forms webpage (http://gradschool.umd.edu/forms).

Performance Reviews

Each department is responsible for determining procedures for review and evaluation of Graduate Assistants and for informing GAs of these procedures. The process of evaluation will vary by departments, and may include written assessment of work by an individual faculty member, classroom visitation by designated faculty members, and written student evaluations. The results of reviews and evaluations should be discussed with the GA concerned.

Termination or Loss of Support

A Graduate Assistant's appointment may be terminated before the expiration of its designated term for loss of funding, for cause, for academic delinquency, by written notice, and by voluntary mutual agreement.

1. *Loss of Funding*. A graduate assistantship may be terminated on account of a loss, reduction, or reallocation in appropriation, grant, contract, gift, or other funds with which to support the appointment. Subject to the fiscal priorities of the unit, programs will make a good faith effort to find alternative funding for the full term of the appointment for a GA who is in good standing and making satisfactory progress to degree. The University will give the GA 30 calendar days written notice of termination for loss of funding.
2. *Cause*. An appointment may be terminated immediately for cause. The following are examples of sufficient cause for removal: incompetence, inefficiency, wanton carelessness or neglect of duty, insubordination, repeated or extended absence, and misconduct related to the GA's suitability or capacity to continue to perform assignments. A GA may be suspended from responsibilities without pay pending the investigation of cause for termination of the appointment.
3. *Academic Delinquency*. An appointment may be terminated if the GA is not making satisfactory academic progress to a degree or is otherwise not in good academic standing. The termination shall be in writing and may be immediate or with such notice as the University believes compatible with the GA's academic situation, not to exceed 30 calendar days.
4. *Written Notice*. An appointment may be terminated by delivery of 30 days written notice to the GA.
5. *Voluntary Agreement*. With the agreement of the University, an appointment may be terminated by the voluntary written resignation of the GA.

Special Appeals Process

A Graduate Assistant whose appointment shall be terminated for the reasons 1, 2, 3, or 4 above, may obtain a review by the Chair of the Department under the Informal Consultation procedure in Section VII, below. Thereafter, if desired, the GA may obtain a special review by the Dean of the unit where the assistantship is located.

1. The GA shall initiate the formal review by sending a letter to the College or School Dean with copies to the faculty member and the Department Chair. To be considered, the letter must be received by the Dean within 15 calendar days from the date the GA is first informed of the intent to terminate the assistantship. The grounds for appeal in terminations based on *Loss of Funding, Academic Delinquency*, and *Written Notice* shall be prejudicial procedural error and/or a violation of substantive due process.

2. The burden of proof in these types of termination shall be upon the GA. The burden of proof in terminations for *Cause* shall be on the faculty member to demonstrate that cause exists and warrants termination.

Upon receipt of the letter requesting formal review, the Dean will:

1. Solicit a written response from the faculty member; and,
2. Offer to meet with the GA and the faculty member, either individually or together, before reaching a decision. The Dean shall consult with the Department Chair and such other persons as the Dean believes may be knowledgeable about the matter. The Dean shall endeavor to convey a written decision and, where appropriate, the remedy, to the GA and the faculty member within 10 calendar days of receipt of the letter requesting formal review.
3. The decision of the Dean shall be final in all matters pertaining to the review.

Renewal and Non-Renewal of Appointment

The University does not guarantee an appointment as a Graduate Assistant will be renewed at the end of its designated term. Although appointments are often renewed, the University cannot promise and there can be no expectancy that a graduate assistantship will be continued over an extended period of time.

For assistantships in non-academic units, "Dean" shall mean the Vice President of the division.

A termination would violate substantive due process if it is arbitrary or capricious or if it were based on an illegal or unconstitutional consideration.

Duties and Time Commitments

The assigned duties of a Graduate Assistant are consistent with the objectives of the teaching and research missions of the university, including the objective that assistantships are to be educationally productive for graduate students. Workload expectations of the department, and of the student's advisor/supervisor, should be explicit and clear. The appointment may be full-time (20 hours per week) or half-time (10 hours per week).

Departments are to provide work assignments that GAs receiving full stipends can satisfactorily complete in no more than a 20-hour average work week, and are to ensure that GAs spend no more than 20 hours per week on average throughout the term of appointment on work unrelated to their research. The actual number of hours required to complete assignments in any given week may vary.

Graduate Teaching Assistants

The specific duties of Graduate Teaching Assistants (TAs) vary across disciplines and departments. For the majority of teaching assistants, however, assignments and responsibilities fall into four categories:

- Assuming teaching responsibility for a laboratory or discussion session of a course;
- Assuming teaching responsibility for a classroom section of a multi-sectional course, under the close supervision of the director(s) of the course;
- Assisting a faculty member in the grading, advising, and administrative duties necessary for a course(s);
- Assisting in general departmental administrative duties, such as advising or the administration of community programs, workshops, etc.

Within a department, the particular assignment depends on the department's needs and the experience and academic qualifications of the TA. All graduate TAs serving in any capacity are under the direction and close supervision of a member of the faculty. Prior to the start of the assistantship, supervising faculty member and the TA will meet to review and confirm expectations including a summary for the nature of required duties. To facilitate the discussions, a Statement of Mutual Expectations for Teaching Assistants (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/gta_statement_of_mutual_expectations.docx) can be found on the Graduate School website.

Time Commitment: For TAs, the 20-hour average should include the time spent in faculty lectures, class preparation, classroom or laboratory teaching, reading and commenting on student papers or examinations, office consultation, and other duties required to carry out the teaching role. Although it is understood that weekly workload will fluctuate during the term of appointment, a Teaching Assistant with a full-time appointment shall be required to work no more than an average of twenty hours per week during the term of appointment on specifically assigned duties related to his/her appointment, excluding non-TA-related activities associated with academic progress toward the degree. A Teaching Assistant with less than a full-time appointment shall work a prorated portion of a full-time appointment on specifically assigned duties related to his/her appointment, excluding non-TA-related activities associated with academic progress toward the degree.

The time that TAs devote to their assignments varies. The proportion of hours spent in preparation, classroom or laboratory time, and grading, for example, differs from one discipline to another. In some disciplines, a new TA may find that a task such as grading initially requires more time than the usual 20-hour weekly average allows. In determining the amount of time expected for a teaching assignment, consideration shall be given to such factors as type of instruction, number of students instructed, and all other factors, including those specific to the course or group of courses to which the instructional duty expectations apply.

TAs may be required to come to campus prior to the actual beginning of classes to participate in orientation and class-preparation duties. TAs usually complete their formal duties when examinations have been graded.

Graduate Research Assistants

The specific duties of Graduate Research Assistants (RAs) vary according to the nature of the research project in which they participate and the source of the funding. RAs may occasionally be asked to conduct some work at home or to do their research at times when classes are not officially in session. The duties of RAs are also performed under the close direction and supervision of a member of the faculty. Prior to the start of the assistantship, the supervising faculty member and the RA will meet to review and confirm expectations including a summary of the nature of required duties. To facilitate the discussions, a Statement of Mutual Expectations for Research Assistants (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/statement_of_mutual_expectations_april_2016.docx) can be found on the Graduate School website.

Time Commitment: For RAs, the 20-hour average should include the time spent in library and/or laboratory, and on all other research tasks providing assistance to the assigned project.

Graduate students working on research projects funded by grants are often also working on material directly related to their theses or dissertations. It is not unusual in such cases for grant work and personal work to merge and for the work time to consume far more than the usual 20-hour weekly average.

Graduate RAs usually follow the project director's instructions regarding work when classes are not in session.

Graduate Administrative Assistants

A number of academic and non-academic units employ Graduate Administrative Assistants (AAs), generally to perform administrative support functions in an office setting. Such positions are expected to have a research or professional development component. Some administrative appointments are for less than one academic year. Prior to the start of the assistantship, the supervising faculty or staff member and the AA will meet to review and confirm expectations including a summary of the nature of required duties. To facilitate the discussions, a Statement of Mutual Expectations for Administrative Assistants (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/statement_of_mutual_expectations_final_-_administrative_assistants.docx) can be found on the Graduate School website.

Time Commitment: For AAs, the 20-hour weekly average should include all time spent on assigned duties, including mandatory training sessions. Unless explicitly stated in writing, AAs are expected to work no more than the 20-hour average work week. If greater amounts of time are periodically required, the unit must provide the AA with an offer letter that includes a statement of expected duties, approximate dates when extra hours might be necessary, and maximum work hours required. If the AA is required to work more than 20 hours in a given week, the time should be deducted from another week.

Just as the unit may require the AA to work more than 20 hours in a given week to meet peak work periods, the AA may request that he or she be allowed to reduce time in a given week to finish a paper or study for an exam and make up the hours later. Such arrangements are allowed and encouraged and should be made between the student and the student's supervisor within the unit.

AAs follow the staff holiday and vacation schedule. Consequently, if the campus is closed (for any reason) for regular staff, AAs who normally would work those days will receive the appropriate compensation and will not be required to make up the hours missed.

Conflict Resolution

A GA who experiences problems related to workload should address them without delay through the process indicated in "Grievance" Section below.

Compensation

Compensation and Stipends

Three categories (called Steps) are currently used for the classification of graduate assistantships. These steps, based on a student's experience and progress toward the degree, determine compensation levels. Graduate Assistants fall into one of the three steps: Step I is only for first-year GAs; Step II is for second-year GAs, as well as for those students, new or continuing, holding a master's degree; and Step III is reserved for doctoral candidates.

The Graduate School sets the minimum stipend level for Step I. Departments and programs determine their own increments for Step II and Step III within guidelines set annually by the Graduate School. All GAs working within a particular step, in a particular unit, should be paid the same assistantship stipend.

TAs must be offered a 9.5-month or 12-month assistantship due to duties and responsibilities occurring after the last day of classes.

Additional Employment: On-Campus

Graduate Assistants may be employed on campus for an additional 10 hours per week beyond their assistantship duties, with an overload approval. No individual may be employed in two capacities in the same department without an overload approval. International students may be limited to a certain number of hours of employment according to their visa status; these students should check with International Student and Scholar Services (http://international.umd.edu/ies/97).

Domestic students who are GAs and who wish to hold more than one position on campus may do so only if the second position is paid on an hourly basis with Labor & Assistants funds (subcode 2075). This policy is necessary to avoid complications concerning benefits. For such individuals, the only benefits allowed are those associated with the graduate assistantship.

Additional Employment: Off-Campus

It is expected that the combined responsibilities of graduate studies and assistantship duties will fully occupy a student during the academic year. The University, however, does not prohibit Graduate Assistants from accepting outside employment in addition to their assistantship appointment. It is up to the GA to determine how much time, if any, he or she can devote to additional activities while still maintaining satisfactory progress toward the degree and satisfactory fulfillment of the assistantship responsibilities. Departments and programs have the discretionary right, however, to make appointments to students whose commitment suggests that they are most likely to attain their educational goals and maintain their assistantship responsibilities expeditiously and effectively.

Overload Payments for Graduate Students

Overload requests are for temporary, short-term arrangements only. They must be limited to one semester per request and must be received and approved prior to the beginning of the appointment. No graduate student

may be employed in two capacities within the same department without an overload approval.

9.5-month Appointments

A full-time GA (20 hours per week) on a 9.5-month appointment must have an overload approval for any on-campus employment above the assistantship assignment while classes are in session for the Fall and Spring semesters.

An overload request must be submitted for Winter Term *only* if the student is teaching a Winter Term course, as a TA or lecturer, in addition to his or her normal assistantship assignment.

An overload request must be submitted for Summer terms *only* if a student (a) is paid in the home unit over four equal pays for summer *or* is paid hourly for 20 hours per week *and* (b) also will be paid in a second unit or in Summer Programs. (The overload form should be completed for the second unit or Summer Programs.)

Graduate Assistants in a 12-week program must submit an overload request for each 12-week term.

12-month Appointments - Semester Term Programs

A full-time GA (20 hours per week) on a 12-month appointment must have an overload approval for any employment above the assistantship assignment when classes are in session during Fall and Spring semesters.

During Winter Term and Summer terms, an overload request must be submitted *only* if the student is teaching a class, either as a TA or lecturer, in addition to the assistantship appointment.

12-month Appointments - 12-Week Term Programs

An overload request must always be submitted for each 12-week term.

International Students

Federal Law prohibits international students from working more than 20 hours per week while classes are in session; international students holding full-time assistantships (20 hours) are therefore ineligible for overload assignments during the Fall and Spring semesters or during a 12-week term.

Sources of Funding

GAs may not be employed in more than one position eligible for benefits; their percentage on payroll may not exceed 50%. Hours over and above the assistantship must be paid with Labor & Assistants funds (subcode 2075).

Retirement and Social Security (FICA)

Retirement benefits are not withheld from the salaries of Graduate Assistants. GAs are exempt from Federal Insurance Contribution Act (FICA) taxes provided that they maintain enrollment and are registered with at least half-time status in the term (Semester or 12-week) they are holding an assistantship.

TAX STATUS

Pursuant to U.S. federal tax code revisions effective January 1, 1987, all graduate students are liable to pay income tax on compensation received for Graduate Assistantships. The amount remitted for tuition is a benefit and is not taxed. A GA with questions about tax obligations should consult a tax counsel or the Internal Revenue Service (1-800-829-1040).

VOLUNTEER GRADUATE ASSISTANT

Under no circumstances should graduate students serve as volunteer graduate assistants where they are expected to provide service with no stipend, at a stipend not commensurate with the expected load, or without appropriate payment of tuition and fees. Course credit cannot be awarded to a student performing in the role of a graduate assistant in lieu of a stipend. Circumstances that may warrant an exception to this policy must be approved in advance by the Graduate School on a case-by-case basis..

Tuition Remission and Mandatory Fees

Graduate Assistants on a full-time appointment (20 hours per week) are eligible for 10 credits of tuition remission in the Fall and Spring semesters and 4 credits in Winter Term. GAs on a half-time appointment (10 hours per week) are eligible for 5 credits of tuition remission in the Fall and Spring semesters and 2 credits in Winter Term. GAs on a full-time *12-month appointment* are also eligible for up to 8 credits of tuition remission during Summer; and GAs on a half-time *12-month appointment* are eligible for up to 4 credits during Summer.

Tuition remission is credited at the prevailing standard in-state credit hour rate at the time the class is taken. Some programs, such as the MBA, have higher credit hour rates or flat fee pricing. The tuition remission benefit does not cover the difference, which remains the responsibility of the GA.

Tuition remission does not cover Mandatory Fees. Please see the Schedule of Classes (http://www.testudo.umd.edu) for a current schedule of Mandatory Fees.

Residency Classification

All Graduate Assistants on a full-time or half-time appointment are billed at the in-state rate for credits taken during their appointment, including any credits taken over the tuition remission allowance. *Official residency classification, however, does not change.* Consequently, at any time when a graduate student is no longer supported by an assistantship—including summer months if the student is on a 9.5-month assistantship—he or she will be billed according to the official residency status that was assigned upon admission. Thus, a student may pay in-state rates during the academic year but out-of-state rates during the summer if the student is classified as out-of-state. Graduate students are urged to be aware of their official residency classification status and to address any problems immediately.

Contact Residency Reclassification Services at resclass@umd.edu or 301-314-9596 for more information regarding changing residency classification and changing residency statuses.

Health Insurance

Graduate Assistants on a full-time or half-time appointment may enroll in the university employee health benefits program. The personnel coordinator in the student's department should be able to provide appropriate forms. GAs must enroll within 60 days of their initial employment to be eligible for a health care program. GAs may enroll their spouses and children under this program.

Any graduate student who is ineligible for the employee health care program may enroll in the student health insurance program offered by the University Health Center. For more information, call the University Health Center Insurance Office at 301-314-8165.

Facilities and Parking

It is the expectation that departments will provide Graduate Assistants with suitable workspace, laboratory space, and, when necessary, office space. GAs also generally have access to desks, file space, mailboxes, computers, telephones, and duplicating machines or services.

Vehicles must display a valid UMCP parking permit or be parked in metered spaces. While GAs are not assigned to faculty parking lots, the Department of Transportation Services endeavors to assign GAs to a student lot close to the building where they work. Students who register early have the best choice of parking assignments. The Department of Transportation Services is located on the ground floor of Regents Parking Garage, phone 301-314-PARK. Parking for GAs is not subsidized; each GA is responsible for the cost of his or her parking permit.

Time Away from Duties

The objective of graduate assistantships is education. They are a component of learning and, as practicum, advance understanding through application. Stipends are an acknowledgment both of the expense and need for support during graduate education and of the contribution made by the Graduate Assistant to the mission of the University. The relation between the GA and a professor is academic, partaking of the traditions and practices of the academy. While an appointment as graduate assistant shares some attributes of employment, these are secondary. Time away from duties is foremost time away from class, not time away from the office. The following "Time Away" policies reflect these principles.

A. *Accrued Leave.* Graduate Assistants do not earn paid annual, personal, or sick leave.

B. *Time-Away from Duty.* Graduate Assistants working full-time on 12-month appointments may have time-away from their duties. A full time (20 hours per week), 12-month assistantship carries the expectation that the GA will be allowed ten workdays (40 hours) of collegially supported absence. Graduate Assistants working full-time on 9- and 9.5-month appointments carry the expectation that they will be allowed 30 hours of collegially supported absence. Graduate Assistants on half-time appointments will be allowed half of the hours afforded to full-time graduate assistants in similar appointments. The eligible time is awarded on a calendar year basis and multiple appointments do not increase the amount of time during the calendar year. Graduate Assistants working full-time on 9- and 9.5-month appointments carry the expectation that they will be allowed 30 hours of collegially supported absence. Graduate Assistants on half-time appointments will be allowed half of the hours afforded to full-time graduate assistants in similar appointments. The eligible time is awarded on a calendar year basis and multiple appointments do not increase the amount of time during the calendar year. Time away from duties must be taken while holding an appointment. It may not be accumulated or transferred. It does not include time when the University is closed. Because colleagues must perform the GA's responsibilities during an absence, reasonable notice (at least 7 days, if the need for leave is foreseeable) and prior approval by the GA's supervisor are required.

Time-away from duty may be used for such purpose as the GA elects and is, therefore, distinct and separate from allowable absences for illness, maternity, or adoption.

C. *Absence due to Illness*. If a Graduate Assistant becomes ill, time away from duties should initially be supported collegially. Occasional, short-term absences on account of illness generally will not require the use of the allowable "time-away from duty" days.

In the event an absence due to illness extends for a period longer than two weeks, support for time away from duties must be requested by the GA and lies in the discretion of the head of the funding unit (in the case of a State supported assistantship) or of the Principal Investigator or other grant administrator (in the case of an externally funded assistantship). The GA's request must be accompanied by supporting medical documentation satisfactory to the University, including a letter from a physician or other licensed heath-care professional that provides (1) the nature of the illness; (2) a statement that the GA should not return to work for health reasons; and (3) the duration of the required absence. The University may require the GA to have a fitness for duty examination prior to resuming duties.

D. *Absence due to Maternity or Adoption.* On February 20, 2013, the Graduate Council updated the approved *Graduate Assistant Parental Accommodation Guidelines,* subsequently endorsed by the Offices of the Provost and President.

Graduate Assistant Parental Accommodation Guidelines

It is important that graduate assistants becoming parents be accommodated; that parental accommodation be regarded as accepted practice; that the terms of an accommodation be reasonable and appropriate; that accommodations within a unit be consistent and equitable in application; and that a request for parental accommodation, if denied, receive timely review.

1. Graduate Assistants will be provided a guaranteed parental accommodation of six weeks, retaining their full stipends and benefits during the accommodation. If both parents are Graduate Assistants, the six-week accommodation will be divided between them.
2. Departments, faculty, and graduate assistants should continue to work collegially on further details of the accommodation, recognizing that these may differ from case to case owing to individual student circumstances and departmental cultures. The Graduate School Parental Accommodation Form should be submitted at least eight weeks prior to anticipated leave and is available on the Graduate School's Forms webpage (http://gradschool.umd.edu/forms).
3. A graduate assistant whose request for a reasonable accommodation is not approved should consult first with his or her Director of Graduate Studies or Department Chair, next with his or her college Dean, and last, if necessary, with the Dean of the Graduate School. Alternatively, the assistant may go directly to the Ombuds Officer for Graduate Students for advice and/or informal mediation. In either case, the Dean of the Graduate School will serve as the final arbiter between college/department and student.

Approved by the Graduate Council on February 20, 2013

Conduct and Professional Behavior

A Graduate Assistant's teaching, research, and administrative activities are subject to the ethical precepts and codes of the academic profession, to the laws of the State of Maryland regarding its employees, and to University policies governing institutional obligations. Violation of any of these regulations constitutes a basis for disciplinary action in accordance with procedures set forth in the University's policies.

In their interactions with students, faculty, and all other members of the university community, GAs are expected to conduct themselves with the

same sensitivity and thoughtfulness that they expect to receive from others. The University Human Relations Code states that the University of Maryland affirms its commitment to a policy of eliminating discrimination on the basis of race, color, creed, national origin, sex, sexual orientation, marital status, personal appearance, age, physical or mental disability, political affiliation, or on the basis of the exercise of rights secured by the First Amendment of the United States Constitution.

The precepts stated above apply equally to GAs and to supervisors of GAs.

Scholarly Misconduct

Scholarly misconduct means fabrication, falsification, plagiarism or other misconduct in proposing, performing, reviewing, or reporting research and/or in connection with other scholarly or creative activities.

Other terms such as research fraud, scientific misconduct, or research misconduct are subsumed within the term scholarly misconduct. Scholarly misconduct does not include honest error or honest differences of opinion. A finding of scholarly misconduct requires that there be a significant departure from accepted practices of the scholarly community for maintaining the integrity of the research or scholarly record; the misconduct must be committed intentionally, or knowingly, or in reckless disregard of accepted practices; and the allegation must be proven by a preponderance of relevant evidence.

The full text of the University of Maryland's Procedures for Scholarly Misconduct can be found on the University System of Maryland's webpage (http://www.usmh.usmd.edu/regents/bylaws/SectionIII/III110.html).

Sexual Harassment

The University of Maryland is committed to maintaining a learning and work environment in which students, faculty, and staff can develop intellectually, professionally, personally, and socially. Such an environment must be free of intimidation, fear, coercion, and reprisal. The University prohibits sexual harassment. Sexual harassment may cause others unjustifiable offense, anxiety, and injury. Sexual harassment threatens the legitimate expectations of all members of the campus community. Academic progress or progress in employment is determined by the publicly stated requirements of classroom and job performance, and the campus environment will not unreasonably impede study or work.

Sexual harassment by university faculty, staff, and students is prohibited and constitutes violation of campus policy. Sexual harassment may also constitute violations of the criminal and civil laws of the State of Maryland and the United States. For the purpose of campus policy, sexual harassment is defined as follows: 1) unwelcome sexual advances; or 2) unwelcome requests for sexual favors; and 3) other behavior of a sexual nature where:

- Submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or participation in a university-sponsored educational program or activity; or
- Submission to or rejection of such conduct by an individual is used as the basis for academic or employment decisions affecting that individual; or
- Such conduct has the purpose or effect of unreasonably interfering with the individual's academic or work performance, or of creating an intimidating, hostile, or offensive educational or working environment.

The full text of the University of Maryland Sexual Misconduct Policy and Procedures can be found online (http://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/Sexual%20Misconduct%20Policy%20%26%20Procedures%20A-C%2013May2016.pdf).

Statement on Sexual Relationships and Professional Conduct

While sexual relationships between instructors and the students in their classes are not prohibited in the sense that penalties are attached to such conduct, all members of the campus community are urged to consider the ethical concerns that may arise as a result of such relationships.

All members of the campus community should understand that sexual relationships that occur in the context of educational evaluation are generally deemed very unwise because they present serious ethical concerns. Many professional codes of conduct prohibit sexual relationships that occur within the context of one's profession. Accordingly, faculty, supervisors, and Teaching Assistants are warned about the possible costs of even an apparently consenting relationship. The element of power implicit in sexual relationships occurring in the academic-evaluation context can diminish a student's actual freedom of choice. There is doubt whether any such relationship can truly be consensual. In addition, sexual relationships between a faculty member or Teaching Assistant and a student create an environment charged with potential conflicts of interest. Questions of favoritism frequently arise. As a result, such conduct may subvert the normal structure of incentives that spur work and learning and interjects attitudes and pressures that are not consonant with the education policies and principles to which the campus is committed.

The full text of the University's Statement on Consensual Relationships and Professional Conduct can be found at the end of the University of Maryland Sexual Misconduct Policy and Procedures (http://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/Sexual%20Misconduct%20Policy%20%26%20Procedures%20A-C%2013May2016.pdf).

Equal Opportunity Statement

The University of Maryland is an equal opportunity institution with respect to both education and employment. The university does not discriminate on the basis of race, color, religion, age, national origin, sex, or disability in admission to or access to, or treatment of employment in, its programs and activities, as required by federal law (Title VI, Title IX, Section 504) and state laws and regulations. Inquiries regarding compliance with Title VI of the Civil Rights Act of 1964, as amended, Title IX of the 1972 Education Amendments, Section 504 of the Rehabilitation Act of 1973, or related legal requirements should be directed to:

Director, Human Relations Program
Office of Human Relations
1130 Shriver Lab
University of Maryland
College Park, MD 20742
Telephone: 301-405-2838

Inquiries concerning the application of Section 504 and Part 34 of C.F.R. to the University of Maryland may be directed to:

Director, Disability Support Services
0106 Shoemaker Hall
University of Maryland
College Park, MD 204742

Telephone: 301-314-7682 (V/TTY)

Grievance Procedures

The University is an academic and collegial community. Regular and clear communication between Graduate Assistants and their advisors and supervisors is essential to maintaining an effective educational environment. GAs who believe their workload is not in conformity with these *Policies for Graduate Assistantships* may seek a review in accordance with this Section.

In addition to workload, a GA may also seek review under this Section of whether the GA is receiving Overload Payments, Tuition Remission, and Time Away from Duties in accordance with these *Policies*.

For the purpose of this Section, "workload" shall mean the greater of (a) the average number of hours assigned to the GA throughout the term of an appointment (e.g., 20 hours per week), or (b) the average number of hours throughout the term reasonably required for an experienced GA in the GA's department to complete the GA's assigned work.

In all instances noted above, the GA should attempt to resolve these matters locally, collegially, and informally. If the difficulty has not been resolved to the GA's satisfaction through informal means, then he or she may elect to file a formal grievance.

Informal Consultation

The Graduate Assistant should first attempt to resolve the difficulty by discussing the situation with his or her faculty advisor/supervisor as expeditiously as possible.

1. In the case of a TA, this usually would be the professor in charge of the course; in the case of an RA, the director of the research project on which the student is working; in the case of an AA, the immediate supervisor of the student in the unit in which the student is working.

The GA should provide the reasons for complaint and a suggested resolution/remedy.

If a satisfactory resolution is not reached, the GA should next discuss the situation with the Chair of the Department.

2. Either before or after such discussions, the GA may wish to seek advice from another academic advisor, the Director of Graduate Studies of the GA's program, an associate dean of the Graduate School, or the Ombuds Officer for Graduate Students. The GA is strongly encouraged to consult with the Ombuds Officer early in the informal discussion process, and must consult with the Ombuds Officer before initiating a formal grievance.

Ombuds Officer for Graduate Students

The Ombuds Officer is available to all graduate students with questions or concerns related to their graduate experience, including their roles as GAs. The Ombuds Officer provides informal assistance in resolving conflicts and works to promote fair and equitable treatment within the University. The Ombuds Officer works confidentially within the scope of the law. The purpose of the Ombuds Officer is to ensure that the graduate student's voice is heard and that problems receive prompt and impartial attention. The Ombuds Officer does not advocate for an individual; rather, the Ombuds Officer advocates for a fair process that promotes the University's commitment to excellence in graduate education and in the graduate student experience. Queries may be directed to Ombuds Officer for Graduate Students, The Graduate School, 2103 Lee Building, phone (301) 405-3132.

Formal Grievance

Most problems related to assistantships are resolved through informal consultation. If a problem pertaining to Workload, Overload Payment, Tuition Remission, or Time Away for Duties has not been solved informally to the GA's satisfaction, he or she may initiate a formal grievance. The formal procedures outlined below are intended to provide a mechanism through which grievances related to assistantships can be formally made and decided.

The Grievance Procedure

The process of formal consideration offers the GA a review by the Dean of the Graduate School or by a panel appointed to make a recommendation to the Dean of the Graduate School. The steps are as follows:

If a satisfactory resolution has not been achieved following informal consideration by the Chair of the Department, the GA may initiate a formal grievance by sending a letter to the Dean of the Graduate School. To be considered, it must be received by the Graduate Dean within 30 calendar days from the action involved or from the GA having reasonable knowledge of it. Under exceptional circumstances, that deadline may be extended at the discretion of the Graduate Dean.

1. The letter must be signed and:
    a. Contain a clear description of the facts giving rise to the grievance; and,
    b. Identify the provision(s) of these *Policies for Graduate Assistantships* which have been violated; and,
    c. Set forth the desired remedy; and,
    d. Be copied to the faculty member and the Chair of the Department.
    e. Elect to have the Graduate Dean decide the grievance either:
        i In the manner described in Paragraph 2.c., below; or,
        ii Following receipt of a recommendation from a three-person panel appointed by the Graduate Dean to consider the matter.
2. Upon receipt of a letter of formal grievance, the Graduate Dean will:
    a. Share the letter with the Dean of the appropriate college or school; and,
    b. Solicit a written response from the Department Chair.
    c. Offer to meet with the GA and the faculty member, either individually or together, before reaching a decision. The Graduate Dean shall consult with the Academic Dean and such other persons as the Graduate Dean believes may be knowledgeable about the policies and practices involved. The Graduate Dean shall endeavor to convey a written decision and, where appropriate, the remedy, to the GA and the faculty member within 15 calendar days of receipt of the letter of grievance.
    d. If the GA elects to have a panel, the Graduate Dean will appoint two graduate faculty (one of whom shall chair the panel) and one graduate student, each familiar with the GA's discipline but not from the GA's program or department, to review the matter and make a recommendation. The Graduate Dean will provide the panel with the letter of formal grievance and the written response of the Department Chair. The panel shall offer to meet with the GA and the faculty member and proceed in the manner described in Paragraph 2.c, above.

        The Panel shall provide the Graduate Dean a written report containing a statement of the issues, the panel's findings of fact, the controlling policy provisions, the panel's conclusions

regarding the merits of the grievance, and a recommended disposition of the grievance, including any suggested remedy.

The Graduate Dean shall decide the grievance and fashion any necessary remedy, giving substantial weight to the findings, conclusions, and recommendations of the panel.

The decision of the Graduate Dean regarding the merits of a grievance and, where appropriate, the remedy, shall be final.

General Principles Controlling Formal Grievance Procedures

These Section VII procedures are not intended to mimic a courtroom and be adversarial in nature. Rather, they are formal in the meaning of offering a structured method to investigate, weigh and remedy differences. They are designed to preserve collegiality and minimize injury to the student-faculty relationship. Because grievances, if not made known or not considered expeditiously, threaten the learning experience, GAs, faculty, and administrators share responsibility alike to deal with them promptly. Experience has shown that the following rules promote the orderly and efficient disposition of grievances. Accordingly, they shall be observed:

1. There is a burden of proof. The GA has the responsibility of convincing the Graduate Dean or panel of three things: a) that the *Policies of Graduate Assistantships* has not been followed; b) that the GA has been adversely affected; and c) and that the requested remedy is appropriate.
2. All matters to be considered in support or defense of a grievance should be made known as early in the informal process as possible. Absent extenuating circumstances, matters not raised in the informal process should not be considered in the formal process. In both the informal and formal process, it is the responsibility of the GA and faculty member, respectively, to produce in a timely way the evidence they each wish considered, including any documents and witnesses.
3. The Grievance Procedure is not a trial. Formal rules of evidence commonly associated with criminal and civil trials may be counterproductive in an academic investigatory process and shall not be applied. The Dean, Graduate Dean, and three-member panel shall give effect to the rules of confidentiality and privilege, but shall otherwise accept for consideration all matters which reasonable persons would accept as having probative value in the conduct of their affairs, giving it such weight as they consider proper. Unduly repetitive, irrelevant, or personally abusive material, however, should be excluded. They may also consider matters within the common knowledge and experience of University faculty, including published policies of the University System of Maryland and the University of Maryland.
4. The GA may be assisted at any meeting by an advisor, who must be a registered, degree-seeking graduate student at the University. Although the GA is expected to take an active role in all meetings, the advisor may help with the presentation of arguments and evidence.
5. The University has in place other grievance procedures and administrative processes designed to address specific types of claims. These are meant to be the exclusive avenue for review and redress. Grievances that by their subject matter may be considered under other established institutional procedures must be brought under those procedures and may not be considered under this these Section VII formal procedures. Matters pertaining to the general level of wages, wage patterns, fringe benefits, or to other broad areas of financial management and staffing are not grievable. Matters expressly excluded from consideration under other procedures may not be grieved under these Section VII formal procedures. These procedures also may not be used to challenge faculty judgment about a GA's academic performance (including, for example, test scores, grades, waivers, dissertation defenses and other indicia of mastery of subject matter and taught skills).
6. The filing of a grievance does not relieve the GA of the obligation to perform all duties as assigned unless and until otherwise decided pursuant to a decision under these procedures. All remedies will operate prospectively. Financial awards (e.g., "back pay," "damages," "compensation," and "raises") may not be awarded. The acceptance of a proposed remedy by the GA shall terminate the grievance process. The matter may not then be further considered or additional remedies sought under other campus procedures.
7. A decision may not be made at any step that conflicts with or modifies a policy, regulation, or grant of authority approved by the Board of Regents, the Chancellor, the President, the Provost, or the University Senate or with any applicable Federal or State of Maryland law.
8. Only currently enrolled University of Maryland graduate students may initiate a formal grievance. The grievance must pertain to the GA's personal services, not those of another GA. Group grievances are not permitted, although similar grievances may be consolidated and processed together as a single issue. As a general matter, where a number of individual grievances have been reduced into a single grievance, not more than three GAs selected by the group may be excused from their duties to attend.
9. Because it is critical to address potentially corrosive grievances sooner than later, and because the remedies available are prospective, the time requirement established for initiating a formal grievance is necessary to the effective administration of the graduate program. Unless otherwise agreed in advance among the GA, the faculty member, and the Graduate Dean, strict adherence to them is a condition of review and appeal under these Section VII procedures. Time requirements are measured from the first occurrence of an event; "continuing" wrongs are not recognized for the purpose of satisfying time requirements.
10. The Graduate Dean may delegate such parts of his responsibilities as he deems reasonable and efficient, provided the final decision and any remedy must be reviewed and approved by the Dean personally.

In this Section VII, the term "faculty member" designates the individual directing and supervising the GA. Depending on the circumstances of the GA's appointment, this person may, in fact, be a University staff employee, and not on the faculty. It is the design of these procedures that the GA first raise the matter of concern with the individual whose direction or decision has given rise to complaint.

In this Section VII, the term "Chair of the Department" shall also mean, as appropriate to the GA's appointment, the Program Director or the unit head in non-departmental colleges and schools and in administrative departments.

For the purpose of this Section VII, "Dean of the appropriate college or school" or "Dean of the unit" means the academic dean of the unit where the assistantship is located. For assistantships in non-academic units, "Dean" shall mean the Vice President of the division.

These include, for example, the *Code of Academic Integrity*, the *Policy on Arbitrary and Capricious Grading*, the *Code of Student Conduct*, the *Procedures for Scholarly Misconduct*, the *Human Relations Code*, the *Policy and Procedures on Sexual Harassment*, the *Policy on Student Classification for Admission and Tuition Purposes*, the *University of*

Maryland Policy on Intellectual Property and the *Policy on Acceptable Use of Information Technology Resources*.

The resolution of a "workload" grievance, for example, may entail a reduction in work hours, future overload pay when approved and budgeted, time management training, and referral to the Center for Teaching Excellence.

Graduate Student Fellowships

Graduate fellowships are merit-based awards that enable the recipient to focus on graduate study, that do not have to be repaid, and that generally include both a stipend and tuition remission. Fellowships differ from Graduate Assistantships, which carry an obligation to teach classes, to work on a research project, or to perform administrative tasks.

Fellowship offers are made by graduate programs to incoming students as part of a recruitment package; some are made to current students through competitive awards processes. Applicants to graduate programs and current students should contact the relevant program for more information on available fellowships.

Fellowships are funded either internally, through several Graduate School's Fellowship programs, or externally, through a variety of outside funding agencies. A list of the Graduate School Fellowship and Award Programs can be found here (http://gradschool.umd.edu/funding/student-fellowships-awards).

The University of Maryland is committed to diversity and encourages programs to offer support to a diverse range of students consistent with campus principles of equal opportunity.

Status

Fellowships and scholarships are offered only to graduate students admitted to or enrolled in graduate degree programs at the University of Maryland. Fellows and scholars are expected to devote themselves full time to graduate study and to register full time as defined by the unit system. Students on fellowships and assistantships must be registered for **48** units. Audited courses do not generate units and cannot be used to determine full-time status. Fellows who also hold half-time assistantships need only register for **36** units to maintain full-time status.

Doctoral Candidates are automatically registered for Candidacy Tuition (899) each semester. This will satisfy the unit requirement for full-time status.

For more information about unit requirements, please view the registration policies page. (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?registration-policies)

Qualifications

Students whose records indicate superior academic achievement and promise and who will increase diversity in their graduate program may be nominated for fellowships and scholarships. The determination of academic merit is based on undergraduate and graduate Grade Point Averages (GPA); scores on such national tests as the Graduate Record Examination (GRE) (http://www.ets.org/gre), Graduate Management Admissions Test (GMAT) (http://www.mba.com), and the Miller Analogies Test (MAT (http://www.milleranalogies.com)); the judgment of academic professionals in letters of recommendation; the nominee's Statement of Goals and Research Interests; and the nominee's Statement of Experiences.

External Fellowship Funding

External Graduate Fellowships are fellowships sponsored and funded by organizations outside the university. Corporations, charitable foundations, and numerous other groups fund graduate fellowships.

Private and Non-University Sponsored Fellowships. UMCP has several government and privately funded fellowships that are handled through the graduate programs and colleges. Some of these fellowships are won independently by students in national competitions; others are awarded directly to the colleges or programs, which then select student recipients. Students submitting applications for admission to graduate programs will be considered for such awards as appropriate; no additional application forms are required. Our graduate students are supported on fellowships from the Department of Defense, Ford Foundation, National Science Foundation, Woodrow Wilson National Fellowship Foundation, to name just a few. In addition, several graduate programs sponsor fellowship programs jointly with federal agencies, such as the National Institutes of Health, NASA, and the National Institute of Standards in Technology.

Matching Tuition Scholarships for External Fellowships. These scholarships are awarded, subject to the availability of funding, to students who have received external fellowships that provide a stipend, but do not provide separate funds to cover the cost of tuition. The Graduate School policy on External Fellowship Tuition Remission is listed here.

Fellowship & Award Offer Letters

A formal offer letter specifying the award of a **Graduate School fellowship** is sent to the student from the Dean of the Graduate School in the spring semester. This letter specifies the stipend level, the duration of the commitment, the amount of tuition remitted, and the details of the fellowship or scholarship.

Duties

No service of any kind, either during the tenure of a scholarship or fellowship or in the future, is to be required of a fellow or scholar by their mentor or their graduate program. Fellows and scholars will carry out independent research under the supervision and guidance of-and sometimes in collaboration with-their mentors. Typically, at the start of their tenure as fellows or scholars, inexperienced students will require more supervision and guidance. Eventually, however, fellows in particular, should be treated as junior research associates. Under no circumstances are they to be assigned routine technical or administrative duties or given teaching assignments during the years in which they are supported by fellowships or scholarships.

Supplementation of Support

Students are not allowed to hold two full fellowships ($15,000 or higher each) concurrently. Please contact the graduate school if this situation occurs.

Gifts, departmental fellowships, or other special funds may provide additional support, in an amount not to exceed half the stipend of the fellowship or scholarship. If the fellowship allows, the fellow may be supplemented by an appointment to a position such as a half-time or quarter-time graduate assistantship, or by hourly employment not to exceed 10 hours per week.

Domestic students must consult the award's Memorandum of Understanding (MOU) or the Award Guidelines to determine

eligibility for supplementary employment. International students should consult International Student and Scholar Services (http://globalmaryland.umd.edu/offices/international-students-scholar-services) by phone at 301-314-7740, regarding supplementary employment while on fellowship.

Additional On-Campus and Outside Employment

According to university policy, full time fellows and scholars may work on-campus or off-campus for a maximum of 10 hours per week in addition to holding the fellowship or scholarship as long as the fellowship rules allow for supplementary employment. In other words, fellows may be hired on a half-assistantship (which requires 10 hours per week) or work 10 hours per week on an hourly basis. This restriction on employment is intended to assure that students make rapid progress toward their degrees.

International fellows should consult International Student and Scholar Services (http://globalmaryland.umd.edu/offices/international-students-scholar-services) by phone at 301-314-7740, regarding supplementary employment.

Deferral or Duplication of Support

Students are not allowed to hold two full fellowships or scholarships, either internal or external awards, or a combination of both, simultaneously. Fellows or scholars who receive offers of external fellowships, such as National Science Foundation (http://www.nsf.gov/funding), Ford Foundation Fellowships (http://www.fordfound.org), or any other private or university-administered fellowships may request to defer their Graduate School fellowship or scholarship offer until such time as their other fellowship expires. Assuming satisfactory academic progress at that time, the student may again resume the Graduate School fellowship or scholarship.

Overload Payments for Graduate Fellows

If a circumstance arises that a fellow must work over the 10 hours per week, an overload form is necessary. This includes the winter term. Overload requests should be for temporary, short-term arrangements only. The request must be limited to one semester per request and must be received and approved by the Graduate School prior to the beginning of the appointment.

Stipend Disbursement

Fellowships are awarded for the academic year only. Stipend disbursements for US citizens and Permanent Residents may be given in lump sums at the start of each semester or spread out monthly. This disbursement is processed through the student award system. For international students, those on a J1 or F1 visas, the disbursement must be processed through payroll. Fellows must receive stipends within the ranges below in order to qualify for associated benefits.

Tuition Remission and Mandatory Fees

The Graduate School provides tuition remission to graduate fellowship recipients who are paid from University and Dean's Fellowship funds, or from external fellowship funds meeting the criteria specified below. Tuition remission and health insurance subsidies are subject to continued availability of resources. Tuition remission will be provided only for credits that are degree applicable.

Graduate Fellows Holding University or Dean's Fellowships (entered through the Student Award System found on www.ares.umd.edu)

- A **University Fellow** may be eligible for up to 12 credits of fellowship tuition remission per semester (Spring and Fall only). **A University Fellowship (UF)** must supplement a standard support package (assistantship, external fellowship, Dean's Fellowship, and/or other internal fellowship). Tuition remission credits deriving from that support package will be applied first and augmented by fellowship tuition remission up to the maximum remission indicated below:

Type	Funding Per Year	Total Annual Credits	Fall	Spring
University Fellowship (paid in 1yr)	$20,000	24	12	12
University Fellowship (paid over 2 yrs)	$10,000	10	5	5
University Fellowship (paid over 4 yrs)	$5,000	0	0	0

- A **Dean's Fellow** maybe eligible for up to 12 credits of fellowship tuition remission per semester (Spring and Fall only). A **Dean's Fellowship (DF)** may be combined with a University Fellowship, additional Dean's Fellowships, and/or other funding (assistantship, external fellowship, and/or other internal fellowship) to create the support package. Tuition remission credits deriving from other funding will be applied first. Tuition remission credits for **Dean's Fellowships** will be provided up to the maximum remission indicated below:

Type	Funding Per Year	Total Annual Credits	Fall	Spring
Three Dean's Fellowships	≥$15,000	24	12	12
Two Dean's Fellowships	≥$10,000	10	5	5
One Dean's Fellowship	$5,000	0	0	0

1. **Graduate Fellows Holding Prestigious External Fellowships** (use the *Request for Tuition Remission for External Fellowships and Scholarships* form found on the Graduate School Forms (https://gradschool.umd.edu/forms) page on the Graduate School website.

   Graduate students holding **prestigious external fellowships** may be eligible for fellowship tuition remission. A Memorandum of Understanding (MOU) or contractual agreement must be filed with the Graduate School. Unless otherwise specified in the MOU or contract, fellowship tuition remission credits up to 10 credits will be awarded as follows:

   - A prestigious external fellowship carrying an annual stipend of at least $15,000 may be awarded up to 10 credits of tuition remission per semester.

- A prestigious external fellowship carrying an annual stipend of at least $7,500 may be awarded up to 5 credits of tuition remission per semester.
- A prestigious external **fellowship carrying an annual stipend of less than $7,500 is not eligible for tuition remission**

2. **Graduate Fellows on Federal Training Grants**

   (use the *Training Grant Fellowship Matching Tuition Remission Request* found on the Graduate School Forms (https://gradschool.umd.edu/forms) page on the Graduate School website,

   Federal Training Grants covering only partial tuition for fellows may be eligible for an institutional match of fellowship tuition remission. Upon written agreement with the Graduate School, tuition remission may be awarded to Training Grants on a 60% (grant) / 40% (GS) matching basis.
3. **Graduate Fellows Holding Internal Fellowships Other Than University or Dean's Fellowships**
   Fellowship tuition remission is not awarded to fellowships funded from department or college sources; state monies from any source, including DRIF, UM, and UMCP Foundations, unless formal agreements have been made with the Graduate School. Tuition for these fellowships should be charged to the account to which the stipend is being charged.
4. **Tuition Remission for Summer Sessions and Winter Term**
   Fellowship tuition remission is not awarded for Summer Sessions or Winterterm.
5. **Tuition Remission for Programs with Non-Standard Tuition**
   Fellows enrolled in graduate programs with non-standard tuition rates (whether by course or by flat-fee pricing) will be responsible for tuition costs above the standard rate covered by fellowship tuition remission.
6. **Other**
   The Graduate School's Graduate Dean's Fellowships, the Wylie Dissertation Fellowships, the Lee Thornton Fellowship, the Spencer Award, and the Longest Award are eligible for candidacy fellowship tuition remission. Please see the official Fellowship Guidelines for each of these fellowships for complete information about tuition remission eligibility. Fellowships and Award guidelines can be found on the Graduate School Funding web page (https://gradschool.umd.edu/funding/student-fellowships-awards).

Residency Classification

The official residency classification of students holding fellowships, assistantships, and scholarships does not change as result of their awards, but remain resident or non-resident as indicated in the original admissions offer. Fellows and scholars who also hold a half-time graduate assistantship will be billed in-state tuition as a benefit of their status only while they hold that assistantship. When/if the graduate student is no longer supported by the assistantship-including summer months if the student is on a 9.5-month assistantship-he or she will be billed according to their official residency status determined at the time of their admission.

Students are expected to be aware of their official residency classification status, how their assistantship, scholarship, or fellowship may affect their billing for each semester, and to address any problems immediately to avoid incurring unexpected tuition charges.

Questions about residency classification and changing status for those who intend to become residents of the State of Maryland for tuition and billing purposes under the University System of Maryland Board of Regents policy should be addressed to:

Residency Classification Office
Room 1130 Mitchell Building
Phone 301-314-9596
Web: http://www.registrar.umd.edu/resreclass.html
Email: resclass@umd.edu

Tax Status

Fellows and scholars must pay tax on the stipends they receive to cover living and general expenses, but may deduct certain educational expenses. Amounts awarded in payment of tuition are not taxable for fellows. Taxes are not withheld from stipends disbursed through student financial aid so you may choose to file an estimated tax payment. Please refer to the *Internal Revenue Service Tax Publication 970, Benefits for Education*, for more information regarding the tax status of fellowship and scholarship stipends or call 1-800-829-1040.

Health Insurance

Graduate fellows supported by **University Fellowships**, **Dean's Fellowships**, or **prestigious external fellowships** are eligible to receive a reimbursement of one-half of the annual United Health Care (UHC) insurance premium for *individual coverage*.

The UHC plan must be purchased *prior* to submitting a request for reimbursement to the Graduate School. The Health Insurance Reimbursement Request Form can be found at http://gradschool.umd.edu/forms.

University or Dean's Fellows must provide a Health Insurance Reimbursement Request Form, proof of payment, and copy of insurance card.

Holders of prestigious external fellowships must provide a Health Insurance Reimbursement Request Form, proof of payment, copy of insurance card and a copy of the fellowship MOU or contract.

Ann G. Wylie Dissertation Fellows are entitled to a sum of up to $1,000.00 in addition to their stipend for the cost of the health insurance premium for one semester of coverage.

Lee Thornton Dissertation Fellows are entitled to a sum of up to $1,000.00 in addition to their stipend for the cost of the health insurance premium for one semester of coverage.

The following graduate fellows are *not* eligible for this subsidy: fellows holding *internal* fellowships other than University or Dean's Fellowships; fellows holding half or full-time assistantships entitling them to employee health insurance benefits; and fellows who are part-time students.

For information on the United Health Care plan, please visit the University Health Center website at http://www.health.umd.edu/insurance. United Health Care offers online enrollment at http://www.firststudent.com/.

Vacation and Sick Leave

There is no policy on vacation and sick leave for fellows or scholars. Fellows and scholars are required to maintain satisfactory academic performance in order to retain their support. A fellow or scholar may request deferment of a semester or year of fellowship tenure if

documented personal illness prevents him or her from satisfactorily completing academic requirements.

Facilities

Fellows are fully integrated into departmental activities and are to be provided with the same facilities as other graduate students, such as mailboxes, office space, access to a telephone and computer, and email and internet access.

Academic Record

Developing a Program

The student is responsible for ascertaining and complying with the policies and procedures of the Graduate School and all applicable graduate program requirements that govern the individual program of study. Registration for the newly admitted graduate student seeking a certificate or degree begins with a visit to the student's academic advisor in the graduate program to which the student has been admitted. There the student will obtain information about specific certificate or degree requirements for satisfactory progress that supplement those of the Graduate School. The student should consult the *Schedule of Classes*, and should develop an individual program of study and research in consultation with his or her graduate advisor. Students admitted as Non-Degree Seeking Students may seek advice from the Graduate School , Graduate Directors, or from appropriate faculty members. Petitions for waivers of regulations of graduate degree requirements or for appeals of decisions of graduate program faculty or administrators should be directed to the Dean of the Graduate School, 2125 Lee Building.

Academic Integrity

The University is an intellectual community. Its fundamental purpose is the creation and dissemination of knowledge. Like all other communities, the University can function properly only if its members adhere to clearly established goals and values. Essential to the fundamental purpose of the University is the commitment to the principles of truth and academic honesty. The Code of Academic Integrity is designed to ensure that the principle of academic honesty is upheld. While all members of the University community share this responsibility, The Code of Academic Integrity is designed so that special responsibility for upholding the principle of academic honesty lies with students.

Honor Pledge

On every examination, paper or other academic exercise not specifically exempted by the instructor, the student will write by hand and sign the following pledge:

I pledge on my honor that I have not given or received any unauthorized assistance on this examination.

Failure to sign the pledge is not an honors offense, but neither is it a defense in case of violation of this Code. Students who do not sign the pledge will be given the opportunity to do so. Refusal to sign must be explained to the instructor. Signing or non-signing of the pledge will not be considered in grading or judicial procedures. Material submitted electronically should contain the pledge; submission implies signing the pledge.

On examinations, no assistance is authorized unless given by or expressly allowed by the instructor. On other assignments, the pledge means that the assignment has been done without academic dishonesty, as defined in the Code of Academic Integrity, available online (https://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/III-100A.pdf).

The pledge is a reminder that at the University of Maryland students carry primary responsibility for academic integrity because the meaningfulness of their degrees depends on it. Faculty are urged to emphasize the importance of academic honesty and of the pledge as its symbol.

Penalties for Violations of Academic Integrity

Students who are found to have falsified, fabricated, or plagiarized in any context, such as course work, laboratory research, archival research, or thesis / dissertation writing--will be referred to the Office of Student Conduct. The Office of Student Conduct (https://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/III-100A.pdf) has some discretion in determining penalties for violations of the University's standards of academic integrity, but the normal sanction for a graduate student found responsible for a violation of academic integrity will be dismissal (suspension or expulsion) from the University.

To review the whole policy on academic integrity, see the University of Maryland Code of Academic Integrity (https://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/III-100A.pdf). The Code was amended on November 7, 2014.

Academic Record (Transcript)

A graduate student's academic record (transcript) is intended to serve as a complete history of the student's academic progress at the University of Maryland. Under no circumstances will academic records be altered because of dissatisfaction with a grade or other academic accomplishment.

Grade Point Average Computation

The A+ and A is calculated at 4 quality points, A- at 3.7 quality points, B + at 3.3 quality points, B at 3 quality points, B- at 2.7 quality points, C+ at 2.3 quality points, C at 2 quality points, and C- at 1.7 quality points. The grades of D+, D, D-, F, and I receive no quality points. Students do not earn credit toward the degree for courses in which they receive a grade of D +, D, D-, or F. For graduate students, all courses taken that are numbered 400 and above (except 500-level courses, those numbered 799, 898, or 899, and those graded with an S) will be used in the calculation of the grade point average. A student may repeat a course in an effort to earn a better grade. Whether higher or lower, the most recent grade will be used in computing the grade point average. Grades for graduate students remain as part of the student's permanent record. Changes in previously recorded grades may be made if made within one term (semester or 12-week term) from original posting of the grade and if the original instructor certifies that an actual mistake was made in determining or recording the grade. The change must be approved by the department chair and the Dean of the Graduate School. Graduate credit transferred from another institution will not be included in the calculation of the grade point average.

Criteria for Courses to be Accepted for Graduate Credit

Any courses, workshops or seminars that take place in a span of time less than a normal academic term (semester or summer session or 12-

week) and offering graduate credit to the participants must meet the following criteria:

- There must be 15 "contact hours" per graduate credit.
  - Lectures: 50 minutes of lecture are equivalent to 1 contact hour.
  - Non-lecture contact (laboratories, workshops, discussion and problem-working sessions, etc.): One two-hour or three-hour session is equivalent to one contact hour.
- No more than three "contact hours" per day will be permitted. (Three "contact hours" are equivalent to 0.2 credits).
- Credit may be accumulated at the rate of no more than one credit per week.
- Courses numbered at the 100-, 200-, 300, and 500-level are ineligible for graduate credit. 400 level classes are eligible for graduate credit provided they were not used in fulfillment of an undergraduate degree requirement.

Credit by Examination

Credit by examination will be awarded upon successful completion of a formal examination (typically written) at a normal standard for examinations within the department/program. The examination must be approved by a committee composed of the examiner plus two Full Members of the Graduate Faculty. A copy of the examination, the student's answers, and the names of the examiner and the approving faculty member must be placed in the student's file in the department/program.

Normally, credit by examination is not available for 600 level and higher courses. The maximum number of credits by examination that can be applied to a master's degree is 12 for a non-thesis master's degree and six for the thesis option. The graduate program in which the student is enrolled may establish a limit on the number of credits that may be earned in this manner. Information on fees for Credit by Examination is available from the Office of the Registrar.

Incomplete Grades

An incomplete is a mark that an instructor may award to a student whose work in a course has been qualitatively satisfactory, but who is unable to complete some portion of the work required *because of illness or other circumstance beyond the student's control.* In awarding the mark of "I" for graduate courses other than 799 and 899, instructors must fill out an "Incomplete Contract for Graduate Students." The contract will specify the work remaining to be completed, the date by which the work must be completed, and the letter grade that will replace the incomplete if the work is not completed by the date specified. It must be signed by the instructor and the student and maintained by the department offering the course. The student is responsible for providing a copy of the contract to the director of graduate studies in his or her program. All courses must receive a grade by the time the student graduates.

The mark of incomplete in 500-, 600-, 700-, and 800-level courses will automatically roll-over to letter grades if the work is not completed by the specified date. Students are expected to complete courses in which they have received an "I" by a date no more than twelve months from the beginning of the term (semester or 12-week) in which the course was taken or by date of graduation. A course is considered complete in the semester that the contract is fulfilled. The mark of incomplete in 400-level courses will be governed by the rules for awarding incompletes to undergraduate students, including the provision of automatically converting an "I" to a letter grade.

Advisors should stay current with their students in urging completion of incomplete grades, and programs should review the status of incompletes in their annual reviews of students' progress toward their degrees. Students will remain in good standing despite marks of incomplete if the courses are not required for their degrees. For courses required for graduation, students will be considered to be making satisfactory progress only if they fulfill the conditions of any outstanding incomplete contracts in a timely manner. An "I" can remain in place on a student's transcript for a maximum of one year.

Departments and programs may specify the maximum number of incomplete credits students may carry, exclusive of credits in 799 and 899. For graduate courses 799 and 899, the grade of I(ncomplete) must be assigned until the student has completed the thesis/dissertation. Upon successful completion of all degree requirements and the award of the degree, all Incompletes for 799 and 899 will automatically be changed to S, unless the advisor has provided another grade. It is the responsibility of the instructor or department chair concerned to submit the grade promptly upon completion of the conditions of the Incomplete contract. If the instructor is unavailable, the department chair, upon request by the student, will make appropriate arrangements for the student to complete the course requirements.

Transfer of Credit

All graduate study credits offered as transfer credit must meet the following criteria:

- No more than six credit hours of graduate work may be transferred from another institution, unless the program has special approval by the Graduate Council. When changing programs within the University of Maryland, the student may request inclusion of credits earned at the University of Maryland. When moving from non-degree to degree-seeking status, Non-Degree Seeking Students may transfer up to nine (9) graduate credits to the degree program (students admitted as non-degree seeking prior to Fall Term 2017 may transfer up to twelve (12) graduate credits to the degree program), subject to the approval of the Graduate Program.
- The advisor and Graduate Director will need to certify that transfer courses are applicable to the student's program and, for non-University of Maryland courses, that the courses have been re-validated.
- Credit must have been granted by a regionally accredited U.S. institution or foreign university. If the latter, evaluation by the staff of the International Education Services and the Graduate School is required.
- The courses must be graduate level and have been taken for graduate credit at the original institution.
- The student must have earned a grade of "B-" or better in the course.
- The credit must not have been used to satisfy the requirements for any other degree.
- The student must furnish an official transcript to the Graduate School.
- Transfer work satisfies only the 400-level requirements for the master's degree and does not apply to the upper-level requirements.
- The transfer course work must have been taken within seven years of the award of a University of Maryland master's degree for which the student is currently enrolled (all other course work must be taken within five years of the award of master's degree.)

A student seeking acceptance of transfer credit is advised to submit the necessary transcripts and certification of program approval to the

Graduate School as promptly as possible for its review and decision. It should be noted that programs may impose more stringent requirements and time limitations concerning the transfer of credits. In such cases the Graduate School must be notified accordingly. A form for Transfer or Inclusion of Credit is available online on the Graduate School's Forms webpage (https://gradschool.umd.edu/forms).

Satisfactory Progress

The admission of all graduate students is continued at the discretion of the Graduate Director of the program and the Dean of the Graduate School, consistent with the policies and practices of the Graduate School and graduate program. A student must make satisfactory progress in meeting programmatic requirements, must demonstrate the ability to succeed in his or her course of studies or research, and must attain performance minima specified by the graduate program in all or in particular courses; otherwise his or her enrollment will be terminated. Determinations of satisfactory progress occur at the graduate program level. Please contact the Graduate Director for conditions for satisfactory progress.

Graduate Student Parental Accommodation Policy

The University of Maryland Graduate Student Parental Accommodation Policy provides a period of up to six (6) weeks during which new parents may postpone completion of academic requirements. It is intended to provide graduate students with an opportunity to integrate the challenges of new parenthood with the demands of graduate-level training, scholarship, and research. In addition to providing support to young families, this policy seeks to reduce attrition and improve time to degree for students who become parents.

The Parental Accommodation Policy is not a leave of absence. This policy allows students to maintain status as full-time, registered graduate students, and thus be eligible for the rights and privileges of registered students (e.g., access to University resources) while adjusting to their new familial obligations.

During this parental accommodation period, eligible students will continue to be enrolled as full-time graduate students and will continue to pay tuition and fees. Students also will be expected to keep the lines of communication with their departments open and demonstrate to their advisors that they are academically engaged and making progress in coursework and research, though perhaps at a slower pace.

Eligibility

To be eligible to apply for the benefits of the Parental Accommodation Policy, a new parent must

(1) have been enrolled full-time for at least one full semester in a graduate program at the University,
(2) be enrolled full-time at the time of application,
(3) be in good academic standing, and
(4) be making satisfactory progress toward degree.

Any parent (regardless of gender) is eligible to apply.

In the event that both parents are eligible, each is individually entitled to a Parental Accommodation period of up to six (6) weeks. This Parental Accommodation period may be taken concurrently with or consecutively to the Parental Accommodation period taken by the other parent, with or without some overlap. The total combined Parental Accommodation period for both parents, however, may not exceed 12 weeks and must conclude 12 weeks following the child's birth or adoption.

Accommodation

Approval of a student's application for a period of Parental Accommodation allows the student, assuming the prior agreement of instructors, advisor, and academic program, to modify deadlines and academic expectations to accommodate the student's new parental responsibilities. Students may be able to postpone completion of course assignments, examinations, and other academic requirements for a period of up to six (6) weeks. Students who will be enrolled in courses during the accommodation period must meet with their instructors to develop a written plan as to how they will satisfactorily complete the course(s). These plans must be approved and signed by the instructor(s) and submitted as part of the Parental Accommodation Application form. At the end of the accommodation period, students are expected to return to graduate study and resume progress toward completion of their degree. Deadlines with regard to time to degree, time to candidacy, time to comprehensive or qualifying exams, etc. will be extended one semester per childbirth or adoption, upon the request of the student. The total additional time granted for the extension of any deadlines as a result of the student's use of the Parental Accommodation Policy, however, cannot exceed a maximum period of one (1) year, regardless of the number of births or adoptions, or the number of times the student invokes the Parental Accommodation Policy.

The period of Parental Accommodation begins immediately upon the birth or adoption; must be taken in a consecutive block of time; and cannot extend beyond six (6) weeks. The student may not divide the accommodation period into separate periods or defer the accommodation period beyond this time limit. In the event of simultaneous multiple births or adoptions, the maximum Parental Accommodation period for which a student is eligible with respect to that event remains six (6) weeks.

Application

At least eight (8) weeks prior to the anticipated birth or adoption, students must submit a written application for Parental Accommodation signed by the Faculty Advisor, Director of Graduate Studies, and the Chair of their academic department, to the Graduate School. (In unusual or extraordinary circumstances, the Graduate School may accept applications with less than eight week's notice.)

Written plans to complete coursework, signed by the student and the instructor, must be provided for each course in which the student will be enrolled during the accommodation period. The discretion to provide an accommodation that allows a student to be away from the classroom for six weeks rests with the individual course instructor. Faculty are strongly encouraged to work with students to develop an accommodation that permits the student to fulfill academic coursework requirements while benefiting from a period of parental accommodation, and that also maintains fairness with regard to other students. In some cases such an accommodation may not be feasible. In such cases, faculty should provide a written explanation to the department's Director of Graduate Studies as to why the accommodation is not possible, and students should adjust their class schedules accordingly.

The Dean of the Graduate School will review the request and notify the student and the student's academic program if the request for a period of Parental Accommodation has been approved. The Graduate School will coordinate with academic programs to make appropriate adjustments

to the student's deadlines and records. Retroactive requests will not be considered. A copy of the application form is attached.

International students should discuss plans with the Office of International Students & Scholar Services as soon as possible in order to identify and address proactively any individual or unique visa issues and/or to consider the latest applicable regulations. The intent of this policy is to permit all students to maintain their status as full-time, enrolled students during this period of accommodation. Medical complications, prior to or following the birth, are not covered by this policy. If a student is not able to return at the end of the period of accommodation, s/he should consider applying for a Leave of Absence. See the Graduate School's Registration Policies (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?registration-policies) for more information.

Good Standing

In order to maintain good academic standing, every graduate student must maintain a cumulative grade point average (GPA) of 3.0 for all courses taken at the University.

Academic Probation and Dismissal

A student whose cumulative grade point average falls below 3.0 will be placed on academic probation by the Graduate School. When a student is placed on probation, the Graduate School will notify both the student and the Graduate Director of the student's program. Permission of the academic advisor and the Graduate Director will be required for a student on probation to register for courses. Probation will be lifted when the student achieves a cumulative GPA of 3.0.

A student who has completed fewer than 12 credit hours and has a cumulative grade point average below 3.0 in the first term (semester or 12-week) will receive a warning. A student who has completed 12 credit hours or two or more terms (semester or 12-week) and whose cumulative grade point average is below 3.0 will be placed on probation and have one term (semester or 12-week) to raise their grade point average 3.0 or higher or be dismissed from the Graduate School. If the grade point average cannot be raised to 3.0 in that term, the student will be prevented from registering and will be immediately dismissed from the Graduate School.

Time Limitations

Time Limitations for Master's Degrees and Certificates

With the exception of the six credit hours of graduate level course credits applicable for possible transfer to the master's degree and certificate programs, all requirements for the master's degree or graduate certificate must be completed within a five-year period. Time taken for an approved Leave of Absence for Childbearing, Adoption, Illness or Dependent Care does not count toward this five-year limit.

Time Limitations for Doctoral Degrees

Students must complete the entire program for the doctoral degree, including the dissertation and final examination, during a four-year period after admission to candidacy, but no later than nine years after admission to the doctoral program. Students must be advanced to candidacy within five years of admission to the doctoral program. Under certain circumstances, time extensions may be granted by the Graduate School as outlined below. Admission to the degree program terminates if the requirements are not completed in the time specified. Time taken for an approved Leave of Absence for Childbearing, Adoption, Illness or Dependent Care is not counted in these time limitations.

Time Extensions

Master's Degree and Certificate Students

A student who has failed to complete all requirements by the prescribed deadlines may petition his or her graduate program for a one-year extension of time in which to complete the outstanding requirements. This extension may be granted by the graduate program, which must then notify the Graduate School in writing of its decision. The Graduate School will confirm this decision in writing to the student.

A student who has failed to complete all requirements for the degree following the granting of an initial time extension by his or her graduate program, and who wishes to pursue the degree, must seek an additional extension by petitioning the graduate program. If the graduate program supports the request, the request must be forwarded to the Graduate School for review with a letter of support from the Graduate Director that includes a statement that the graduate program has approved the request. Departmental approval may be either a vote of the department as a whole or of a committee designated to deal with such matters, such as the Graduate Committee. The letter must include a time table listing specific goals to be accomplished at various points during the extension period. The letter should also include a request for re-validation of courses that will be more than five years old at the time of graduation. Typically, this extension will be for a maximum of one year. The Graduate School 's decision will be communicated in writing to the petitioner and a copy will be sent to the student's graduate program.

Doctoral Students

Extensions of time for doctoral students must be requested from the Graduate School by the doctoral program. The first request for an extension of the deadline for admission to candidacy or completion of the doctoral dissertation requires a letter of support from the Graduate Director. The letter must include a timetable listing specific goals to be accomplished at various points during the extension period. Normally, the extension will be for a maximum of one year.

The request for a second extension requires a letter of support from the Graduate Director that includes a statement that the graduate program has approved the request. Departmental approval may be either a vote of the department as a whole or of a committee designated to deal with such matters, such as the Graduate Committee. The letter must include a timetable that lists specific goals to be accomplished at various points during the extension period. Typically this extension will be for a maximum of one year.

Requests for a third extension will be honored **only in rare instances** when serious and unforeseen circumstances that are not covered under the Leave of Absence for Childbearing, Adoption, Illness or Dependent Care policy have interfered with the student's normal progress toward the degree. The request for a third extension requires a letter of support from the Graduate Director that includes a statement that the program has approved the request. The letter must include a timetable listing specific goals to be accomplished at various times during the extension period. Typically, this extension will be for a maximum of one year. The third extension is the final extension. **Additional extensions will not be approved by the Graduate School.**

In the event that a graduate program wishes to continue a student in the program beyond a third extension, the following procedures must be followed:

- The student must apply to be readmitted to the graduate program. The application must be accompanied by a letter of support from the

Graduate Director, which indicates the approval of the program for the readmission.

- The Graduate Director's letter must include a timetable listing specific goals to be accomplished at various points during the re-admission period.
- Doctoral students must be advanced to candidacy within one year of re-admission. No extensions will be given for this deadline.
- Doctoral students who have previously advanced to candidacy and who apply for readmission and re-advancement to candidacy must demonstrate that their knowledge is current and consistent with those standards that are in effect in the graduate program at the time that the re-advancement to candidacy is made. The program will determine what constitutes an acceptable level of current knowledge on a case-by-case basis and must include this determination in its recommendation for readmission. This could mean that the student will be required to retake the comprehensive examination or otherwise demonstrate that the student's knowledge is consistent with current standards of the graduate program.
- Re-admitted students who have been advanced to candidacy will be allowed four years to complete the dissertation. No extensions will be given after this deadline.

Master's Degree Policies

Approved Program

The entire course of study undertaken for any master's degree must constitute a unified, coherent program that is approved by the student's advisor and Graduate Director and meets Graduate School requirements.

Credit Hours

A minimum of thirty credit hours in courses acceptable for credit towards a graduate degree is required (some degree programs require more than 30 credits). For a master's degree with the thesis option, six of the 30 credit hours must be thesis research credits (799). For the master's degree with the non-thesis option, a minimum of 18 credit hours in courses numbered 600 and above is required, as well as one or more scholarly papers, some portion of which must be written. In many cases, successful completion of comprehensive examinations is required by the program.

Coursework Level

The graduate program must include at least 12 hours of course work at the 600 level or higher; no fewer than 12 hours of course work credit must be earned in the major subject approved by the graduate program in which the student is enrolled.

Prerequisites and Inclusion of Credit

If the student is inadequately prepared for the required graduate courses, additional courses may be deemed necessary; such courses will not be considered part of the student's approved program of study.

Single Credit Application

Credits to be applied to a student's program for a master's degree cannot have been used to satisfy any other previously earned degrees (see policies governing the applicability of previously taken courses to University of Maryland degrees).

Graduate School Requirements for the Degrees of Master of Arts and Master of Science

A thesis must be submitted for the Master of Arts or Master of Science degrees except for those programs for which a non-thesis option has been approved by the Graduate Council. Approval of the thesis is the responsibility of an Examining Committee appointed by the Dean of the Graduate School on the recommendation of the student's advisor. The advisor is normally the chairperson of the committee, and the remaining members of the committee are members of the graduate faculty who are familiar with the student's program of study. The chairperson and the candidate are informed of the membership of the Examining Committee by the Graduate School staff on behalf of the Dean of the Graduate School.

Research Assurances

Human Subject Research

Everyone at the University of Maryland who is conducting research that involves human subjects must obtain approval in advance from the Institutional Review Board (IRB). The IRB is charged with approving the initiation of research involving human subjects and conducts periodic reviews of that research to ensure that all projects comply with Federal regulations. These regulations are strict and the Graduate School urges all graduate students to consult with the IRB before beginning any research on living subjects. For application forms and guidelines on such issues as research involving minors or prisoners, surveys, and the use of audio taping, videotaping, digital recordings and photographs, please see the Institutional Review Board's website (http://www.umresearch.umd.edu/IRB).

Other Research

If the thesis research involves the use of vertebrate animals, animal use protocols must be approved in advance by the Animal Care and Use Committee. If the thesis research involves hazardous materials, either biological or chemical, or recombinant RNA/DNA, the research must be approved by the appropriate University committee. These research assurances must be approved prior to the initiation of any thesis-related research, and the approvals must be provided to the Graduate School at the time the student submits the Nomination of Examining Committee form.

The Master's Thesis Examination

A final oral examination of the thesis will be held when the student has completed the thesis to the satisfaction of the student's advisor, all other requirements for the degree have been completed, and a 3.0 grade point average (computed in accordance with the regulations described under "Grades for Graduate students") has been earned.

Establishment of the Thesis Examining Committee

The Thesis Examining Committee is appointed by the Dean of the Graduate School, in accordance with the policies listed below:

- **Eligibility**. A student is eligible to be examined on a thesis if the student:
  a. has met all program requirements for a thesis examination,
  b. is in good standing as a graduate student at the University,
  c. is registered for at least one credit,

d. has a valid Graduate School-approved Thesis Examining Committee,
e. has at least a 3.0 grade point average, and
f. if this is the second examination, the examination has been approved by the Graduate School.

- **Thesis Examining Committee Membership.** The Committee will include a minimum of three members of the Graduate Faculty, at least two of whom will be Full Members. The Chair of the Committee normally will be the student's advisor, who will be a Full or Adjunct Member of the Graduate Faculty, or who has been granted an exception to the policy by the Dean of the Graduate School.
- **Membership on a Thesis Examining Committee.** Requires nomination by the student's advisor and Graduate Director in the student's graduate program, and approval by the Dean of the Graduate School . The nomination of a Thesis Examining Committee should be provided to the Graduate School at least six weeks before the date of the expected thesis examination. The thesis examination cannot be held until the Graduate School approves the composition of the Thesis Examining Committee. Furthermore, if the Graduate Faculty status of any member of an approved Thesis Examining Committee changes, the approval of the Thesis Examining Committee may be voided, and a new Committee nomination form will be required for approval by the Graduate School.
- **Chair.** The Thesis Examining Committee will have as chair the student's advisor, who must be a Full or Adjunct Member of the Graduate Faculty or, by special permission, has been otherwise appointed by the Dean of the Graduate School. Thesis Examining Committees may have co-chairs upon the written recommendation of the Graduate Director and with the approval of the Dean of the Graduate School.

Procedures for the Oral Examination

Oral Examination Requirement. Each master's thesis student must defend orally his or her master's thesis as a requirement in partial fulfillment of the master's degree (an additional comprehensive written examination may be required at the option of the program.)

- **Committee Preparation.** The members of the Thesis Examining Committee must receive the thesis at least seven working days before the scheduled examination. Should the Thesis Examining Committee deem it reasonable and appropriate, it may require submission of the thesis more than seven working days in advance of the examination.
- **Attendance at the Examination.** Oral examinations must be attended by all members of the student's officially established Thesis Examining Committee as approved by the Dean of the Graduate School. All examinations must be open to members of University of Maryland Graduate Faculty. Programs may wish routinely to open thesis examinations to a broader audience. In such cases, program policies must be established, recorded, and made available to all master's students. Should a last-minute change in the constitution of the Thesis Examining Committee be required, the change must be approved by the Dean of the Graduate School in consultation with the program's Graduate Director and the chair of the student's Thesis Examining Committee.
- **Remote Participation in Examinations**. The Graduate School policy is that all members of a Thesis Examining Committee must be physically present in the examination room during the entire defense and during the committee's private deliberations following the examination. Participation by telephone is not permitted under any circumstances. While re-affirming this policy, the Graduate Council approved a policy to permit remote participation by video teleconferencing under the following circumstances:
  - Permission to conduct a remote-participation defense must be obtained by the thesis chair from the Graduate School in advance. In making this request, the chair must indicate in writing that he or she has read the rules for a remote defense listed below.
  - Approved web-conferencing software must be used that allows all participants to see and hear each other during the entire defense.
  - Only one remote site may be used during the defense.
  - The candidate and the committee chair must both be present in the examination room. Neither may be at the remote site.
  - The program must pay for any costs associated with the remote participation. The remote participant must connect to the defense using hardware that will ensure that all participants are visible and audible and that the connection is stable and available throughout the scheduled time of the defense.
- **Location of the Examination.** Oral examinations of theses must be held in University facilities that are readily accessible to all members of the Thesis Examining Committee and others attending the examination. The chair of the Thesis Examining Committee selects the time and place for the examination and notifies the other members of the committee and the candidate.
- **Emergency Substitutions**. The Graduate School is aware that last-minute emergencies can prevent a committee member from attending a scheduled thesis examination. We are prepared to work with the thesis supervisor and/or Graduate Director to make last-minute substitutions in committee membership to allow the defense to take place as scheduled. Please follow these steps to assure a smooth substitution.
  - The request must be sent in writing. Fax or e-mail requests are acceptable. A telephone call to the Dean of the Graduate School to alert the Dean that the emergency request is coming will facilitate the process.
  - The proposed substitute must be a member of the Graduate Faculty consistent with the rules for committee membership. Thus, if a Full Member could not attend, the substitution of an Adjunct or Special Member of the Graduate Faculty would not be acceptable.
  - Once the written request has been received, the substitution will be made, usually within the hour, provided that the revised committee meets the requirements for committee membership.
  - When the substitution has been made, a written confirmation, in the same format as the request was received (fax or e-mail), will be sent out, along with a telephone confirmation. The substitution is not official, however, until the written confirmation has been received in the department or program.
  - A defense that is held with one or more substitute members on the committee, but without prior written confirmation from the Graduate School that the substitution(s) have been approved, will be voided and the defense will have to be repeated.
  - A copy of the written request and the written confirmation will be placed in the student's file for future reference.
- **Invalidation of the Examination.** The Dean may void any examination not carried out in accordance with the procedures and policies of the Graduate School. In addition, upon the recommendation of the

Thesis Examining Committee or any member thereof, the Dean of the Graduate School may rule an oral examination to be null and void.

- **Conclusion of the Examination.** After the oral examination, the student and any others who are not members of the Thesis Examining Committee will be asked to leave the room and the Thesis Examining Committee will discuss whether or not the thesis (including its examination) has been satisfactory.

  The Committee has the following options:

  - To accept the thesis without any recommended changes and sign the Report of Examining Committee.
  - To accept the thesis with recommendations for changes and, except for the chair, sign the Report of Examining Committee. The chair will check the thesis and, upon his or her approval, sign the Report of Examining Committee.
  - To recommend revisions to the thesis and not sign the Report of Examining Committee until the student has made the changes and submitted the revised thesis for the Thesis Examining Committee's approval. The Thesis Examining Committee members sign the Report of Examining Committee when they approve the revised thesis.
  - To recommend revisions and convene a second meeting of the Thesis Examining Committee to review the thesis and complete the student's examination.
  - To rule the thesis (including its examination) unsatisfactory. In that circumstance, the student fails.
- Following the examination, the chair must inform the student of the outcome of the examination. The chair signs the Report of the Examining Committee indicating which of the above alternatives has been adopted. A copy of this statement is to be included in the student's file at the graduate program office, and a copy is given to the student.
- **Passage or Failure.** The student passes if all members of the Thesis Examining Committee accept the thesis (including its examination) as satisfactory. One or more negative votes constitute a failure of the candidate to meet the thesis requirement. In cases of failure, the Thesis Examining Committee must specify in detail and in writing the nature of the deficiencies in the thesis and/or the oral performance that led to failure. This statement is to be submitted to the program's Graduate Director, the Dean of the Graduate School , and the student. A second examination may be permitted if the student will be in good standing at the time of the proposed second examination. A second examination requires the approval of the program's Graduate Director and the Dean of the Graduate School . If the student fails this second examination, or if a second examination is not permitted, the student's admission to the graduate program is terminated.
- **The Decision to Accept the Examination as Satisfactory Must Be Unanimous**. Students may present themselves for examination only twice. The report of the committee, signed by each member, must be submitted to the Dean of the Graduate School no later than the appropriate date listed in the *Schedule of Classes* if the student is to receive a diploma at the Commencement ceremony for the semester in which the examination is held.

Submission and Publication of the Thesis

Theses are to be submitted to the Graduate School in electronic format after final approval of the document by the Thesis Examining Committee. See the University of Maryland Thesis and Dissertation Style Guide (http://www.gradschool.umd.edu/current_students/etd_style_guide.html) for the details of this process.

Theses submitted to the University through the ETD process will also be deposited in the UM Library's online electronic archive, DRUM (Digital Repository at the University of Maryland) (http://drum.lib.umd.edu). This is a free public archive of academic work by University faculty and graduate students. The submission of the thesis to the University in fulfillment of degree requirements grants the University the one-time, non-exclusive right to publish the document on DRUM.

The University's Rights

The University of Maryland retains non-exclusive distribution, reproduction, and archival rights to doctoral dissertations submitted to the Graduate Faculty in fulfillment of requirements for a graduate degree. Such rights entitle the University of Maryland to reproduce, archive, and distribute dissertations, in whole or in part, in and from an electronic format, as it sees fit. Distribution is subject to a release date stipulated by the student and approved by the University.

The Student's Rights and Responsibilities

As the owner of copyright in the thesis or dissertation, students have the exclusive right to reproduce, distribute, make derivative works based on, publicly perform and display their work, and to authorize others to exercise some or all of those rights. As a condition of graduation, each student's thesis or dissertation must be published. When the student submits his or her work to the Graduate School , they will be given several options regarding access to their document via ProQuest's *Digital Dissertations* and DRUM *,* the Digital Repository at the University of Maryland . The student's options include:

Making the thesis or dissertation available via ProQuest and DRUM as soon as it is received

The abstract and full text of your work will be present in ProQuest's *Digital Dissertations* for purchase, and will be both freely available and searchable online via DRUM.

Restricting online publication of the thesis or dissertation for either 1 or 6 years

Students may place an embargo (a restriction) on electronic access to your document through ProQuest's *Digital Dissertations* and DRUM if there is legitimate reason to do so. Patents or future publication, for example, might be jeopardized by providing unrestricted access (see below). Should a student elect to restrict online publication of his or her work, a description of the research, including the student's name, the document's title, the advisor's name, and the abstract will be available via ProQuest and DRUM, but the actual electronic file will be unavailable for viewing or download until the selected embargo period has passed.

Restrict online publication of the thesis or dissertation indefinitely

Students may, in rare circumstances, place an indefinite embargo on access to their work. In this case, a description of the thesis or dissertation, including the student's name, the work's title, the advisor's name, and the abstract will be available via ProQuest's *Digital Dissertations* and DRUM, but the actual electronic file will be embargoed indefinitely. This option requires the written approval of the Dean of the Graduate School.This restriction can be lifted at the request of the author at a later date.

These choices only affect the *electronic* distribution of the thesis or dissertation document. A non-circulating copy of each University of

Maryland thesis or dissertation will be available for consultation in Hornbake Library's Maryland Room, and print copies of the document will be made available upon request to researchers through inter-library loan.

Inclusion of One's Own Previously Published Materials in a Thesis or Dissertation

A graduate student may, upon the recommendation of the thesis director, and with the endorsement of the home graduate program Graduate Director, include his or her own published works as part of the final thesis. Appropriate citations within the thesis, including where the work was previously published, are required. All such materials must be produced in standard thesis format.

It is recognized that a graduate student may co-author work with faculty and colleagues that should be included in a thesis. In such an event, a letter should be sent to the Dean of the Graduate School certifying that the student's Examining Committee has determined that the student made a substantial contribution to that work. This letter should also note that inclusion of the work has the approval of the thesis advisor and the Graduate Director. The format of such inclusions must conform to the standard thesis format. A foreword to the thesis, as approved by the Examining Committee, must state that the student made substantial contributions to the relevant aspects of the jointly authored work included in the thesis.

Inclusion of Copyrighted Materials in a Thesis or Dissertation

Students are responsible for ensuring that their thesis or dissertation complies with copyright law. Copyright law gives the owner of a work exclusive rights to reproduce, distribute, display or perform the work publicly and to modify or adapt the work and the exclusive right to grant others permission to exercise any of those rights in the work, *subject to certain exceptions*. Students are responsible for determining if their use of another's work requires his or her permission or falls within one of the exceptions. Permission is not required to use a work when:

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- The work never qualified for copyright because, for example, it lacked originality or was created by Federal employees in the scope of employment.
- Copyright in the work has expired.
- The use qualifies as a fair use.

Students should consult the following documents for guidance on complying with copyright law:

Did the work ever qualify for copyright protection?

- Library of Congress, Copyright Basics (http://www.copyright.gov/circs/circ01.pdf)
- Library of Congress, Ideas, Methods, or Systems (http://www.copyright.gov/circs/circ31.pdf)
- Library of Congress, Blank Forms and Other (http://www.copyright.gov/circs/circ32.pdf)Works Not Protected by (http://www.copyright.gov/circs/circ32.pdf)Copyright (http://www.copyright.gov/circs/circ32.pdf)
  and Copyright Protection Not Available for Names, Titles, or Short Phrases (http://www.copyright.gov/circs/circ34.pdf)

Has copyright in the work expired?

- Library of Congress, Duration of Copyright (http://www.copyright.gov/circs/circ15a.pdf)
- University of North Carolina, When U.S. Works Pass Into the Public Domain (http://www.unc.edu/%7Eunclng/public-d.htm)
- Cornell University, Copyright Term and the Public Domain in the United States (http://copyright.cornell.edu/resources/publicdomain.cfm)

Is the proposed use a "fair use"?

- Library of Congress, Can I Use Someone Else's Work? (http://www.copyright.gov/help/faq/faq-fairuse.html)
- University of Washington Copyright Connection, Fair Use (http://depts.washington.edu/uwcopy/Copyright_Law/Fair_Use)

Non-Thesis Option

For programs offering a non-thesis option, please see the individual program's website.

Professional Master's Degrees

The University of Maryland offers a variety of Professional Master's Degree Programs geared towards working adults. For information about any one of the Professional Master's Program, please visit the graduate programs page (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs.php).

Doctoral Degrees Policies

Credit Requirements

The Graduate School requires that every student seeking the Ph.D. or D.M.A. satisfactorily complete a minimum of 12 semester hours of dissertation credits (899); a student seeking an Ed.D. must satisfactorily complete a minimum of six semester hours of dissertation credits (899). The number of research and other credit hours required in the program varies with the degree and program in question.

Advancement to Candidacy

Preliminary examinations, or such other substantial tests as the graduate programs may elect, are prerequisites for advancement to candidacy. A student must be admitted to candidacy for the doctorate within five years after admission to the doctoral program and at least six months before the date on which the degree will be conferred. It is the responsibility of the student to submit an application for admission to candidacy when all the requirements for candidacy have been fulfilled. Applications for admission to candidacy are made in duplicate by the student and submitted to the graduate program for further action and transmission to the Graduate School . Application forms may be obtained at the Graduate School, Room 2123, Lee Building, or on the web. Paperwork must be received by the Graduate School prior to the 25th of the month in order for the advancement to become effective the first day of the following month.

Doctoral candidates are automatically registered for six (6) credits of Doctoral Dissertation Research (899), for which they pay the flat candidacy tuition.

Research Assurances

Human Subject Research

Everyone at the University of Maryland who is conducting research that involves human subjects must obtain approval in advance from the Institutional Review Board (IRB). The IRB is charged with approving the initiation of research involving human subjects and conducts periodic reviews of that research to ensure that all projects comply with Federal regulations. These regulations are strict, and the Graduate School urges all graduate students to consult with the IRB before beginning any research involving living subjects. For application forms and guidelines on such issues as research involving minors or prisoners, surveys, and the use of audio taping, videotaping, digital recordings, and photographs, please see the Institutional Review Board's website (http://www.umresearch.umd.edu/IRB).

Other Research

If the dissertation research involves the use of vertebrate animals, animal use protocols must be approved in advance by the Animal Care and Use Committee. If the dissertation research involves hazardous materials, either biological or chemical, or recombinant RNA/DNA, the research must be approved by the appropriate University committee. These research assurances must be approved prior to the initiation of any dissertation-related research, and the approvals must be provided to the Graduate School at the time the student submits the Nomination of Examining Committee form.

The Doctoral Dissertation and Examination

A dissertation is required of all candidates for a doctoral degree. The Graduate School has established the following procedures for the conduct of the doctoral dissertation examination.

- **The Dissertation.** The ability to do independent research must be demonstrated by an original dissertation on a topic approved by the graduate program in which the student is earning the degree.
- **Eligibility.** A student is eligible to defend a dissertation if the student (a) has advanced to candidacy, (b) has met all program requirements for a dissertation examination, (c) is in good standing as a graduate student at the University, (d) is registered for at least one credit, (e) has a valid Graduate School-approved Dissertation Examining Committee, and (f) if this is the second examination, the examination has been approved by the Graduate School.
- **Dissertation Examining Committee Membership.** The Committee must include a minimum of five members of the Graduate Faculty, at least three of whom must be Full Members. The Chair of the Committee normally will be the student's advisor, who will be a Full Member of the Graduate Faculty, or who has been granted an exception to the policy by the Dean of the Graduate School. Each Committee will have appointed to it a representative of the Dean of the Graduate School. The Dean's Representative may be one of the five voting members. Alternatively, the Dean's Representative may not be a voting member of the Committee. Whether the Dean's Representative votes or not is a decision made by the student, primary advisor and the Dean's Representative before the Dean's Representative is nominated for approval by the Dean of The Graduate School. In addition, the Dean will ensure that there are five voting members on the Committee. Therefore, Committees that have a non-voting Dean's Representative must have at least six members (five voting members and the non-voting Dean's Representative.)
- **Nomination of the Dissertation Examining Committee.** Membership on a Dissertation Examining Committee requires nomination by the student's advisor and the Graduate Director of the student's graduate program, and approval by the Dean of the Graduate School. The nomination of a Dissertation Examining Committee should be provided to the Graduate School at least six weeks before the date of the expected dissertation examination. The dissertation examination cannot be held until the Graduate School approves the composition of the Dissertation Examining Committee. Furthermore, if the Graduate Faculty status of any member of an approved Dissertation Examining Committee changes, the approval of the Dissertation Examining Committee may be void, and a new Dissertation Examining Committee nomination form may be required to be approved by the Graduate School.
- **Chair.** Each Dissertation Examining Committee will have a chair, who must be a Full Member of the Graduate Faculty or, by special permission, has been otherwise appointed by the Dean of the Graduate School . Dissertation Examining Committees may be co-chaired upon written recommendation of the program's Graduate Director and with the approval of the Dean of the Graduate School; at least one of the co-chairs must be a Full Member of the University of Maryland Graduate Faculty.
- **Representative of the Dean of the Graduate School.** Each Dissertation Examining Committee will have appointed to it a representative of the Dean of the Graduate School. The Dean's Representative should have some background or interest related to the student's research. The Dean's Representative must be a tenured member of the Graduate Faculty at the University of Maryland, College Park. The Dean's Representative must be from another tenure home than the student's primary advisor, or co-advisor(s). In the case of multi-disciplinary programs, the Dean's Representative can be a member of the program, as long as they have a different tenure home from the primary advisor, co-advisor(s), or Doctoral Committee Chair (if the Doctoral Committee Chair is not a primary advisor).

  The person nominated to become the Dean's Representative may serve as a regular member of the student's Doctoral Graduate Committee from the time it is first convened. Alternatively, the person nominated to be the Dean's representative may be added to the Doctoral Graduate Committee at a later date and either take part in some Committee meetings including the qualifying examination, or only join as a Doctoral Dissertation Committee member for the final dissertation defense. In all cases, the Dean's Representative must be present for the full dissertation defense and serve to adjudicate the defense.
- **Special Members.** Individuals from outside the University of Maryland who have been approved for Special Membership in the Graduate Faculty may serve on Dissertation Examining Committees. These Special Members must be in addition to the required three Full Members of the University of Maryland Graduate Faculty. For procedures to nominate an individual for Special Membership, please refer to the section below on Graduate Faculty.
- **Service of former University of Maryland faculty members.** Graduate Faculty who terminate employment at University of Maryland (and who do not have emeritus status) retain their status as members of the Graduate Faculty for a twelve-month period following their termination. Thus, they may serve as members and chairs (but not as Dean's Representatives) of Dissertation Examining Committees

during this twelve-month period if they are otherwise eligible. After that time, they may no longer serve as chairs of Dissertation Examining Committees, although, if granted the status of Special Members of the Graduate Faculty, they may serve as co-chairs.

- **Professors Emeriti and Associate Professors Emeriti** may serve on Dissertation Examining Committees provided they are members of the Graduate Faculty.

Open Dissertation Examination

The dissertation examination will consist of two parts:

- **Part 1 will be a public presentation by the candidate** on the main aspects of the research reported in the dissertation. During Part 1, questions from the audience to the candidate will be permitted. For questions from persons who are not members of the Dissertation Examining Committee, the Chair of the Dissertation Examining Committee will have discretion to decide whether such questions are germane to the topic of the dissertation and how much time will be allotted for the answers.
- **Part 2 will be a formal examination of the candidate** by the Dissertation Examination Committee. This part will be open only to the Dissertation Examination Committee, other members of the Graduate Faculty, and graduate students from the candidate's graduate program. During Part 2, only members of the Dissertation Examination Committee will be permitted to ask questions. Programs may vote to establish a policy to have Part 2 be open only to members of the Dissertation Examining Committee and members of the Graduate Faculty.
- **Attendance at the final discussion and vote** will be limited to the members of the Dissertation Examining Committee.
- **Announcements of the date, time, and location of the examination**, as well as the candidate's name and the dissertation title, will be disseminated five working days in advance to all members of the Graduate Faculty and graduate students within the graduate program in which the candidate's degree is to be awarded. Mass-distribution methods, such as e-mail, a faculty/student newsletter, or individual announcements are acceptable. Merely posting a paper notice on a corridor bulletin board will not constitute a sufficient announcement.
- Departments and graduate programs may petition the Dean of the Graduate School for exceptions to these policies.

Procedures for the Oral Dissertation Examination

- **Oral Examination Requirement.** Each doctoral candidate is required to defend orally his or her doctoral dissertation as a requirement in partial fulfillment of the doctoral degree.
- **Committee Preparation.** The members of the Dissertation Examining Committee must receive the dissertation at least ten working days before the scheduled examination. Should the Dissertation Examining Committee deem it reasonable and appropriate, it may require submission of the dissertation more than ten working days in advance of the examination.
- **Attendance at the Examination.** Oral examinations must be attended by all members of the student's officially established Dissertation Examining Committee as approved by the Dean of the Graduate School. All examinations must be open to all members of the University of Maryland Graduate Faculty. Programs may wish routinely to open dissertation examinations to a broader audience. In such cases, program policies must be established, recorded, and made available to all doctoral students. Should a last-minute change in the constitution of the Dissertation Examining Committee be required, the change must be approved by the Dean of the Graduate School in consultation with the Graduate Director of the student's graduate program and the chair of the student's Dissertation Examining Committee.
- **Location of the Examination.** Oral examinations must be held in University facilities that are readily accessible to all members of the Dissertation Examining Committee and others attending the examination. The chair of the dissertation examining committee selects the time and place for the examination.
- **The Dean's Representative.** The Dean's Representative must be identified at the beginning of the examination. The responsibilities of the Dean's Representative include the following: ensuring that the procedures of the oral examination comply with those of the Graduate School (as described herein) and reporting to the Dean of the Graduate School any unusual problems experienced in the conduct of the examination.
- **Invalidation of the Examination.** The Dean of the Graduate School may void any examination not carried out in accordance with the procedures and policies of the Graduate School . In addition, upon recommendation of the Dean's Representative, the Dean may rule an oral examination to be null and void.
- **Emergency Substitution Procedure.** The Graduate School is aware that last-minute emergencies can prevent a committee member from attending a scheduled dissertation examination and will work with the chair of the examining committee and/or Graduate Director to make last-minute substitutions in committee membership to allow the examination to take place as scheduled.
    - The request must be sent in writing to the Dean of the Graduate School . Fax or e-mail requests are acceptable. A telephone call to the Graduate School explaining that an emergency request is coming will facilitate the process.
    - The proposed substitute must be a member of the Graduate Faculty consistent with the rules for committee membership. Thus, if the Dean's Representative (who must be a tenured faculty member) could not attend, the substitution of an untenured member of the Graduate Faculty would not be acceptable.
    - Once the written request has been received, the substitution will be made, usually within the hour, provided that the revised committee meets the requirements for committee membership.
    - When the substitution has been made, a written confirmation, in the same format as the request was received (fax or e-mail) will be sent out, along with a telephone confirmation. The substitution is not official, however, until the written confirmation has been received in the graduate program.
    - An examination that is held with one or more substitute members on the committee, but without prior written confirmation from the Graduate School that the substitution(s) have been approved, will be voided and the examination will have to be repeated.
    - A copy of the written request and the written confirmation must be placed in the student's file for future reference.
- **Remote Participation in a Dissertation Defense.** Under normal circumstances, all members of a Dissertation Examining Committee must be physically present in the examination room during the entire dissertation defense and during the committee's private deliberations following the examination. Participation by telephone is not permitted under any circumstances. Remote participation by video

teleconferencing is permitted under the following circumstances:

- Permission to conduct a remote-participation defense must be obtained by the dissertation chair from the Graduate School in advance. In making this request, the chair must indicate in writing that he or she has read the rules for a remote defense listed below.
- Approved web-conferencing software must be used that allows all participants to see and hear each other during the entire defense.
- The candidate, the committee chair (or at least one of the co-chairs), and the Dean's Representative must all be present in the examination room; none may be at a remote site.
- If necessary, other members of the committee may participate from one or more remote sites as long as the conferencing software supports the rules of the conduct of the defense. Permission for remote participation must be approved in advance by the Dean of the Graduate School. The request for remote participation must provide a compelling reason and/or explanation as to why each remote committee member cannot be physically present.
- The program must pay for any costs associated with the remote participation. The remote participants must connect to the defense using hardware that will ensure that all participants are visible and audible and that the connection is stable and available throughout the scheduled time of the defense.
- The Dean's Representative is responsible for ensuring that all requirements for remote participation are met, that the remote participation was uninterrupted, and if interrupted, that the defense was paused until all remote participations were fully restored.

- **Student Presentation.** The student is permitted to present briefly a summary of the dissertation, emphasizing the important results and giving an explanation of the reasoning that led to the conclusions reached.
- **Opportunity for Questioning by Members of the Dissertation Examining Committee.** The chair invites questions in turn from each member of the Dissertation Examining Committee. The questioning may continue as long as the Dissertation Examining Committee feels that it is necessary and reasonable for the proper examination of the student.
- **Conclusion of the Examination.** After questioning has been completed, the student and any others who are not members of the Dissertation Examining Committee are asked to leave the room while the Dissertation Examining Committee discusses whether or not the dissertation and its defense are satisfactory. The Committee has the following options:
  - To accept the dissertation without any recommended changes and sign the Report of Examining Committee.
  - To accept the dissertation with recommendations for changes and, except for the chair, sign the Report of the Examining Committee. The chair will check that the changes to the dissertation have been made, and, upon his or her approval, sign the Report of Examining Committee.
  - To recommend revisions to the dissertation and not sign the Report of Examining Committee until the student has made the changes and submitted the revised dissertation for the Dissertation Examining Committee's approval. The Dissertation Examining Committee members sign the Report of Examining Committee if they approve the revised dissertation.
  - To recommend revisions and convene a second meeting of the Dissertation Examining Committee to review the dissertation and complete the student's examination.
  - To rule the dissertation (including its examination) unsatisfactory. In that circumstance, the student fails. Following the examination, the chair, in the presence of the Dean's Representative, must inform the student of the outcome of the examination. The chair and the Dean's Representative both sign a Report of the Examining Committee indicating which of the above alternatives has been adopted. A copy of this statement is to be included in the student's file at the graduate program office, and a copy is given to the student.
- **Passage or failure.** The student passes if one member refuses to sign the Report, but the other members of the Dissertation Examining Committee agree to sign, before or after the approval of recommended changes. Two or more negative votes constitute a failure of the candidate to meet the dissertation requirement. In cases of failure, the Dissertation Examining Committee must specify in detail and in writing the nature of the deficiencies in the dissertation and/or the oral performance that led to failure. This statement is to be submitted to the program's Graduate Director, the Dean of the Graduate School, and the student. A second examination may be permitted if the student will be in good standing at the time of the proposed second examination. A second examination requires the approval of the program's Graduate Director and the Dean of the Graduate School . If the student fails this second examination, or if a second examination is not permitted, the student's admission to the graduate program is terminated.

Submission and Publication of the Dissertation

Dissertations are to be submitted to the Graduate School in electronic format after final approval of the dissertation by the Dissertation Examining Committee. See the *University of Maryland Electronic Thesis and Dissertation (ETD) website* (http://www.dissertations.umi.com/umd)or the University of Maryland Thesis and Dissertation Style Guide (http://www.gradschool.umd.edu/current_students/etd_style_guide.html) for the details of this process.

Dissertations submitted to the University through the ETD process will also be deposited in the UM Library's online electronic archive, DRUM (Digital Repository at the University of Maryland (http://drum.lib.umd.edu)) (http://drum.lib.umd.edu). This is a free public archive of academic work by University faculty and graduate students. The submission of the thesis to the University in fulfillment of degree requirements grants the University the one-time, non-exclusive right to publish the document on DRUM. The students' and University's rights regarding dissertation and thesis submission and publication are outlined below.

The University's Rights

The University of Maryland retains non-exclusive distribution, reproduction, and archival rights to doctoral dissertations submitted to the Graduate Faculty in fulfillment of requirements for a graduate degree. Such rights entitle the University of Maryland to reproduce, archive, and distribute dissertations, in whole or in part, in and from an electronic

format, as it sees fit. Distribution is subject to a release date stipulated by the student and approved by the University.

The Student's Rights and Responsibilities

As the owner of copyright in the thesis or dissertation, students have the exclusive right to reproduce, distribute, make derivative works based on, publicly perform and display their work, and to authorize others to exercise some or all of those rights. As a condition of graduation, each student's thesis or dissertation must be published. When the student submits his or her work to the Graduate School, they will be given several options regarding access to their document via ProQuest's *Digital Dissertations* and DRUM*,* the Digital Repository at the University of Maryland. The student's options include:

- **Making the thesis or dissertation available via ProQuest and DRUM as soon as it is received** The abstract and full text of your work will be present in ProQuest's *Digital Dissertations* for purchase, and will be both freely available and searchable online via DRUM.
- **Restrict online publication of the thesis or dissertation for either 1 or 6 years** Students may place an embargo (a restriction) on electronic access to your document through ProQuest's *Digital Dissertations* and DRUM if there is legitimate reason to do so. Patents or future publication, for example, might be jeopardized by providing unrestricted access (see below). Should a student elect to restrict online publication of his or her work, a description of the research, including the student's name, the document's title, the advisor's name, and the abstract will be available via ProQuest and DRUM, but the actual electronic file will be unavailable for viewing or download until the selected embargo period has passed.
- **Restrict online publication of the dissertation indefinitely** Students may, in rare circumstances, place an indefinite embargo on access to their work. In this case, a description of the thesis or dissertation, including the student's name, the work's title, the advisor's name, and the abstract will be available via ProQuest's *Digital Dissertations* and DRUM, but the actual electronic file will be embargoed indefinitely. This option requires the written approval of the Dean of the Graduate School . This restriction can be lifted at the request of the author at a later date.

Inclusion of One's Own Previously Published Materials in a Dissertation

A graduate student may, upon the recommendation of the dissertation director, and with the endorsement of the home graduate program's Graduate Director, include his or her own published works as part of the final dissertation. Appropriate citations within the dissertation, including where the work was previously published, are required. All such materials must be produced in standard dissertation format .

It is recognized that a graduate student may co-author work with faculty members and colleagues that should be included in a dissertation. In such an event, a letter should be sent to the Dean of the Graduate School certifying that the student's examining committee has determined that the student made a substantial contribution to that work. This letter should also note that inclusion of the work has the approval of the dissertation advisor and the program chair or Graduate Director. The letter should be included with the dissertation at the time of submission. The format of such inclusions must conform to the standard dissertation format. A foreword to the dissertation, as approved by the Dissertation Committee, must state that the student made substantial contributions to the relevant aspects of the jointly authored work included in the dissertation.

Inclusion of Copyrighted Materials in a Dissertation

Students are responsible for ensuring that their thesis or dissertation complies with copyright law. Copyright law gives the owner of a work exclusive rights to reproduce, distribute, display or perform the work publicly and to modify or adapt the work and the exclusive right to grant others permission to exercise any of those rights in the work, *subject to certain exceptions* . Students are responsible for determining if their use of another's work requires his or her permission or falls within one of the exceptions.

Students should consider the following questions and consult the following documents for guidance on complying with copyright law:

Did the work ever qualify for copyright protection?

- The work never qualified for copyright because, for example, it lacked originality or was created by Federal employees in the scope of employment.
- Copyright in the work has expired.
- The use qualifies as a fair use.
- Library of Congress, Copyright Basics (http://www.copyright.gov/circs/circ01.pdf)
- Library of Congress, Ideas, Methods, or Systems (http://www.copyright.gov/circs/circ31.pdf)
- Library of Congress, Blank Forms and Other (http://www.copyright.gov/circs/circ32.pdf)Works Not Protected by (http://www.copyright.gov/circs/circ32.pdf)Copyright (http://www.copyright.gov/circs/circ32.pdf) and Copyright Protection Not Available for Names, Titles, or Short Phrases (http://www.copyright.gov/circs/circ34.pdf)

Has copyright in the work expired?

- Library of Congress, Duration of Copyright (http://www.copyright.gov/circs/circ15a.pdf)
- University of North Carolina, When U.S. Works Pass Into the Public Domain (http://www.unc.edu/%7Eunclng/public-d.htm)
- Cornell University, Copyright Term and the Public Domain in the United States (http://copyright.cornell.edu/resources/publicdomain.cfm)
- Duke University, Center for the Study of the Public Domain (http://www.law.duke.edu/cspd)

Is the proposed use a "fair use"?

- Library of Congress, Can I Use Someone Else's Work? (http://www.copyright.gov/help/faq/faq-fairuse.html)
- University of Washington Copyright Connection, Fair Use (http://depts.washington.edu/uwcopy/Copyright_Law/Fair_Use)

Additional Requirements

In addition to those requirements specified above, each graduate program may impose additional requirements. For these requirements, consult the descriptions that appear under the graduate program listings or the special publications that can be obtained from the graduate programs or colleges.

Graduate School Requirements for the Degree of Doctor of Philosophy

The Doctor of Philosophy Degree is granted only upon sufficient evidence of high attainment in scholarship and the ability to engage in independent research. It is not awarded for the completion of course and seminar requirements no matter how successfully completed.

Foreign Language Requirement

Some graduate programs have a foreign language requirement for the Doctor of Philosophy degree. The student should inquire in the graduate program about this requirement. Students must satisfy the graduate program requirement before they can be admitted to candidacy for the doctorate.

Requirements for the Degree of Doctor of Education

The Ed.D. programs in the College of Education are cohort-based, admitting experienced educational practitioners to emphasize applied research and evaluation, and advanced practice. A minimum of 6-credits of 899 are required for the culminating project. Consult the Graduate Studies Office in the College of Education (http://www.education.umd.edu) and the individual graduate program for additional details.

Requirements for Other Doctoral Degrees

The particular requirements for the degrees of Doctor of Musical Arts (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?MUSC) and Doctor of Audiology (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?CAUD) are given under the corresponding program description. Contact the individual graduate programs with specific questions.

Combined Bachelor's-Master's Programs

In a combined bachelor's/master's program, some graduate level courses initially taken for undergraduate credit may also be applied towards the graduate credit requirements for a master's degree program at the University of Maryland. A bachelor's/master's program may be developed for an individual student, or it may be a structured program. Only graduate programs on the semester term are eligible for the combined degree.

Individual Student Bachelor's/Master's Program

A program may be developed by an individual student in consultation with his/her academic advisor. Such a program is available only to students whose academic performance is exceptional. It is to be developed according to the individual career interests and goals of the student and should be an integrated learning experience rather than merely the completion of a certain number of graduate and undergraduate credits. The proposed program requires the approval of the Directors of both the undergraduate and the graduate programs involved and of the Dean for Undergraduate Studies and the Dean of the Graduate School . Normally no more than nine credits of graduate courses applied to the bachelor's degree may be counted also for graduate credit in an individual student's program. Courses to be double-counted must be at the 600 level or above and must be passed with at least a "B-" grade. Individual study courses, internships, or courses given as credit by examination are not eligible. The credits to be double-counted will be designated as applicable to the graduate program of study after the student receives the bachelor's degree and matriculates in the Graduate School.

Structured Bachelor's/Master's Program

A structured bachelor's/master's program is a clearly defined curriculum combining an existing undergraduate program and an existing master's program at the University of Maryland, offered by the same or by different departments. It is designed for students whose academic performance is exceptional and should be an integrated learning experience rather than merely the completion of a certain number of graduate and undergraduate credits. A proposal for such a program should be submitted by the colleges housing the academic programs concerned and requires the approval of the Graduate Council, the Dean of the Graduate School, the Senate PCC Committee, and the President.

Necessary features of a structured bachelor's/master's program include the following:

- Specific requirements for admission to the combined program that speak to the exceptional performance of the students to be admitted. At a minimum, students accepted for the program must be clearly admissible to the graduate program portion.
- The program should be designed so as not to unduly delay the completion of the bachelor's degree. Taking graduate credits should not unduly limit the breadth of the student's experience through premature specialization.
- All requirements of the bachelor's program and of the master's program must be completed before the student may receive both degrees. Where appropriate, graduate courses taken while an undergraduate may substitute for courses required in the undergraduate major program.
- The students may be offered deferred admission to the Graduate School at the end of the junior year program, subject to completion of the senior year program in a timely fashion and with a specified level of achievement. Formal admission to the Graduate School will require completion of all requirements for the bachelor's degree.
- The credits to be double-counted will be designated as applicable to the graduate program after the student receives the bachelor's degree and matriculates in the Graduate School .

A structured bachelor's/master's program may normally include up to nine credits of graduate level courses that are counted both for the bachelor's program and the master's program. More than nine double-counted credits may be allowed if both of the following conditions are satisfied:

- The additional graduate credits applied to the undergraduate program do not unduly limit the breadth of the student's experience through premature specialization.
- The master's program requires more than thirty credits.

Dual Doctoral and Master's Degrees

Graduate students who are enrolled in a doctoral program in one department/program may enroll concurrently for a master's degree in a related area. Examples would be a doctoral student in PHYS enrolling

concurrently for a masters in MATH or a doctoral student in ECON enrolling concurrently for a master's in BMGT.

The following rules govern the dual-enrollment process:

- The student must be in good academic standing.
- Both graduate departments/programs must agree to the dual-degree enrollment.
- The full degree requirements must be met in both programs.
- The same course cannot be applied to both programs.
- A written plan for the dual enrollment must be worked out between the two departments/programs regarding credits, advising, semester loads, etc. Copies of this plan must be placed in the student's file in each program and a copy sent to the Graduate School to be included in the student's records here.

Once the written plan is filed with the Graduate School, the student's doctoral program will be designated as the primary degree and the masters program will be designated as the secondary degree. Students and advisors should bear in mind that our present computer system has no way of knowing towards which degree a given course grade should be applied for purposes of computing the GPA. Therefore, students enrolled in dual-degree programs will only have an overall GPA, which reflects their combined performance in the two programs. We are unable to provide separate GPAs for the masters and doctoral components of the two programs. Students therefore should be advised that poor performance in their masters program would affect their overall GPA as it is calculated on their transcript.

Existing Dual Degree Programs

Please visit our dual degree programs page (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs.php?search=dual) to find more information.

Graduate Certificate Policies

A post-baccalaureate certificate is awarded for the successful completion of a minimum of 12 credit hours of graduate-level work in a defined subject area under the following conditions:

- The program must include a minimum core requirement of nine credit hours chosen from a limited list as designated by the graduate program.
- Non-core courses must be chosen from a specific list of acceptable options.
- No fewer than nine credit hours must be earned at the 600 level and above.
- In a twelve credit certificate program three credits may be earned at the 400 level; for certificate programs requiring more than 12 credits, a maximum of six credit hours may be at the 400 level.
- All credits for a certificate must be completed at the University of Maryland.
- A minimum grade point average of 3.0 is required for the award of a graduate certificate.
- All requirements for the graduate certificate must be completed within a five-year period.

Information on active Graduate Certificates can be found on our program listing page.

Graduate School Field Committees

Groups of faculty who are engaged in a common research area that crosses disciplinary or sub-disciplinary lines may seek formal recognition as a Field Committee from the Graduate School. It is assumed that these committees will find ways to sponsor collaborative scholarship by faculty and graduate students through the sponsorship of symposia and lectures, the creation of courses, the direction of graduate student research. The University of Maryland currently recognizes several official Graduate School Field Committees (https://gradschool.umd.edu/international-initiatives/field-committees).

The Graduate School supports and encourages intellectual exchange and collegiality among the academic fields and disciplines. These exchanges and interactions distinguish the University from a collection of isolated teaching centers and research institutes, produce advancements in knowledge and intellectual synergy, and promote a dynamic curriculum that reflects the current development of research and scholarship. To foster these activities, the Graduate School encourages the formation of interdisciplinary Field Committees. The purpose of these committees is to enhance collaborative research, foster intellectual achievement, use the Graduate School 's resources to support advanced research, elevate the visibility of the University's expertise in interdisciplinary areas, and attract graduate students.

Requirements for Formal Recognition

- A minimum of five Full Members of the Graduate Faculty, representing at least two disciplines or sub-disciplines, must agree to participate.
- The Field Committee faculty must commit to meeting at least twice a semester.
- The Field Committee faculty must keep regular minutes of the meetings.
- The Field Committee faculty must select a spokesperson or convener for the Committee.

Requirements for Offering Courses and Advising Students

- A set of regularly taught graduate courses must be identified in the Field Committee area.
- The department chair of each member of the Committee must agree to the faculty member's participation in the Committee.
- Approved graduate programs must be willing to admit qualified students who express a prior interest in the Committee, and departments must be willing to consider them for department/University support in an open competition.
- The spokesperson for the Committee must report each semester to the respective Graduate Program Directors on the progress of graduate students who are affiliated with the Committee.

Available Resources for Field Committees

- The Committee may request financial assistance from the Graduate School for brochures and web site development to advertise and promote the field.
- The Committee may request financial support for speakers, symposia, and other intellectual events from the Graduate School .
- The Committee may request a sum equivalent to the cost of a course buy-out for the development of a new course to be offered in the field. Funds will be available for up to two years. In order to receive

Graduate School funds, a department must be willing to support the course at the end of the two-year period if student demand warrants.

- The Graduate School will list the Field Committee in the Graduate Catalog.

The Graduate School will recognize Field Committees for an initial period of five years. At the end of that period, the activities and accomplishments of the Committee will be reviewed. If the Committee members and the Graduate Dean are both satisfied that the Committee is able to foster and enhance intellectual achievements, the Committee's recognition by the Graduate School will be extended for another period of five years, at which point it will be reviewed again. The criteria for each review will be the Committee's accomplishments in enhancing collaborative research and intellectual achievement, and its success in attracting and educating graduate students.

Approved by the Graduate Council on March 15, 2005.

University of Maryland Graduate Faculty Members

The Graduate Faculty are responsible for teaching classes restricted to graduate students, designing the academic content of graduate degree programs, and supervising the writing and defense of graduate student research in the form of theses and dissertations.

Minimum Qualification

To qualify for appointment to the Graduate Faculty, individuals normally will hold the terminal degree in their discipline.

Membership - Graduate Faculty Categories

There are four categories of membership of the Graduate Faculty: Full Members; Associate Members; Graduate Teaching Members; and Special Members. All members of the Graduate Faculty will be associated with a home unit. For Full Members of the Graduate Faculty, the home unit is the primary unit of appointment to rank. For Associate, Graduate Teaching and Special Members of the Graduate Faculty, the home unit is the academic unit responsible for the particular graduate program initiating the request for nomination. Once appointed, members of the Graduate Faculty are available to serve across units and within multi-/cross-/interdisciplinary graduate programs.

Graduate Faculty membership is granted to ensure that graduate education is of the highest quality in terms of programs, intellectual acumen, and cutting-edge research. Members of the Graduate Faculty are expected to conduct themselves ethically and in accordance with University policy. If a member of the Graduate Faculty is deemed to have violated University policy, the Graduate Dean can suspend or remove the faculty member from the Graduate Faculty which will result in the suspension of the rights of membership (i.e., teaching classes restricted to graduate students, designing the academic content of graduate degree programs, and supervising the writing and defense of graduate student research in the form of theses and dissertations). In such cases, the Chair of the Department (or equivalent) and/or the College Dean will ensure that the impacted graduate students are assigned a new advisor and their funding continued. The term of the suspension will be determined by the Graduate Dean in accordance with University policies.

Appointment Procedures

Full Members

Full Members of the Graduate Faculty are tenured or tenure-track faculty at the University of Maryland, College Park, with duties in teaching and research (Assistant and Associate Professors, Professors, and Distinguished University Professors); and College Park Professors. Appointment to the Graduate Faculty is automatic on appointment to the University of Maryland faculty.

Faculty awarded Emeritus status continue as Full Members of the Graduate Faculty for five years after retirement and may be reappointed for additional five-year terms thereafter, subject to nomination by the home unit.

The Nomination to the Graduate Faculty Form is available here. (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/nomination_to_graduate_faculty_form.pdf)

Associate Members

Associate Members of the Graduate Faculty normally come from the ranks specified from the following categories in the UMCP Policy on Appointment, Promotion, and Tenure of Faculty: faculty with duties primarily in research, scholarship, or artistic creativity (Assistant Research Professor, Associate Research Professor, and Research Professor; Assistant and Associate Research Scientist, and Senior Research Scientist; Assistant and Associate Research Scholar, and Senior Research Scholar; Assistant and Associate Research Engineer, and Senior Research Engineer; Assistant and Associate Artist-in-Residence, and Senior Artist-in-Residence); field faculty (Agent, Senior and Principal Agent); faculty engaged exclusively or primarily in library service (Librarian 3 and 4); and additional faculty ranks (Adjunct Assistant and Associate Professor, and Adjunct Professor; visiting appointments that correspond to eligible ranks listed above; and Professor of the Practice, and University of Maryland Professor). Exceptionally, faculty in other ranks with appropriate terminal qualifications, expertise, and experience may be proposed for Associate Membership in the Graduate Faculty.

Appointment is by approval of the Dean of the Graduate School. Nomination for appointment to Associate Member of the Graduate Faculty is made by the Head of the home unit, on the recommendation of the Full Members of the Graduate Faculty in the unit. Each nomination will include a letter of support from the Head of the home unit, confirmation of approval of the Full Members of the Graduate Faculty in the unit, and current curriculum vitae. The term of appointment is five years and is renewable upon re-nomination by the Head of the home unit after appropriate review within the unit. The appointment is terminated upon resignation or retirement.

The Nomination to the Graduate Faculty Form is available here. (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/nomination_to_graduate_faculty_form.pdf)

graduate teaching members

Graduate Teaching Members of the Graduate Faculty are individuals whose primary duty is teaching. A Graduate Teaching Member is expected to have a graduate degree at a minimum. Appointment is by approval of the Dean of the Graduate School. Nomination for appointment to Graduate Teaching Member of the Graduate Faculty is made by the Head of the home unit, on the recommendation of the Full Members of the Graduate Faculty in the unit. Each nomination will

include a letter of support from the Head of the home unit, and current curriculum vitae. The term of appointment is five years and is renewable upon re-nomination by the Head of the home unit after appropriate review within the unit. The appointment is terminated upon resignation.

The Nomination to the Graduate Faculty Form is available here. (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/nomination_to_graduate_faculty_form.pdf)

Special Members

Special Members of the Graduate Faculty are scholars who have no official affiliation with the University of Maryland.

Appointment is by approval of the Dean of the Graduate School. Nomination for Appointment to Special Member of the Graduate Faculty is made by the Head of the home unit, on the recommendation of the Full Members of the Graduate Faculty in the unit. Each nomination will include a letter of support from the Head of the home unit, confirmation of approval of the Full Members of the Graduate Faculty in the unit, and current curriculum vitae. The term of appointment is five years and is renewable upon re-nomination by the Head of the home unit after appropriate review within the unit. The appointment is terminated upon resignation or retirement.

The Nomination to the Graduate Faculty Form is available here. (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/nomination_to_graduate_faculty_form.pdf)

Exceptional Appointments

Exceptions to the procedures listed above may be approved by the Dean of the Graduate School and will be reported to the Graduate Council at its final meeting of each academic year. Each request for an exception will include a letter of justification from the Head of the home unit, making a compelling case that the exception is necessary to fill a particular need, confirmation of approval of the Full Members of the Graduate Faculty in the home unit, and current *curriculum vitae*. All exceptions will be effective for periods of up to five years and may be re-approved for periods of up to five years based on a review in the home unit and the recommendation of the Head of the home unit. The appointment is terminated upon resignation or retirement.

Faculty of Multi-Campus Graduate Degree Programs

Exceptionally, faculty who hold appointments at other institutions of the University System of Maryland and who participate in approved multi-campus graduate degree programs may be appointed Full Members of the Graduate Faculty at the University of Maryland. Such exceptions will be proposed on an individual basis, be subject to approval by the Dean of the Graduate School, and be reported to the Graduate Council at its final meeting of each academic year. Each request for an exception will include a letter of justification from the Graduate Director of the multi-campus program, confirmation of approval of the Full Members of the Graduate Faculty in the program, and current *curriculum vitae*. All exceptions will be effective for periods up to five years, and may be re-approved for periods of up to five years based on a review by the program and the recommendation of the Graduate Director of the program. The appointment is terminated upon resignation or retirement.

Prerogatives of Membership by Category

Full Members

Full Members of the Graduate Faculty are eligible to teach graduate-level courses; serve on program graduate committees; direct Master's thesis research and chair Master's thesis examining committees; direct doctoral dissertation research and chair doctoral dissertation examining committees; and vote for and serve on the Graduate Council and its committees.

Associate members

Associate Members of the Graduate Faculty are eligible to teach graduate-level courses, serve on program graduate committees, direct Master's thesis research, chair Master's Thesis Examining Committees, and co-direct doctoral dissertation research, but not direct doctoral dissertation research or chair Dissertation Examining Committees.

GRADUATE TEACHING MEMBERS

Graduate Teaching Members of the Graduate Faculty are eligible to teach graduate-level courses. Graduate Teaching Members cannot serve as thesis/dissertation advisors nor direct, co-direct, or serve on thesis and dissertation committees.

Special Members

Special Members of the Graduate Faculty are eligible to serve on program graduate committees and co-direct Master's thesis research, but may not direct or co-direct doctoral dissertation research or chair Master's Thesis or Doctoral Dissertation Examination Committees.

Membership of Former University of Maryland Faculty

Full Members of the Graduate Faculty who terminate their employment at the University of Maryland under honorable circumstances (and who do not have emeritus status) may for a 12-month period following their termination serve as members and Chairs of Dissertation examination committees. They may not serve as Dean's representatives.

Exceptions to Policy

Exceptions to the prerogatives listed above must be approved by the Dean of the Graduate School and will be reported to the Graduate Council at its final meeting of each academic year. In particular, the Dean of the Graduate School may authorize Associate and Special Members of the Graduate Faculty to chair a doctoral Dissertation or master's Thesis Examining Committee on the recommendation of the home unit that the member possesses the requisite skills and scholarly expertise. Each request for an exception will include a letter of justification from the Head of the home unit, making a compelling case that the exception is necessary to fill a particular need, confirmation of the approval of the Full Members of the Graduate Faculty in the home unit, and a current *curriculum vitae*. No exceptions will be made for Graduate Teaching Members of the Graduate Faculty.

Other Graduate School Policies

Waiver of a Regulation

All policies of the Graduate School have been formulated by the Graduate Council with the goal of ensuring academic quality and approved by the Provost. These policies are to be equitably and uniformly enforced. Circumstances occasionally occur that warrant individual consideration. A graduate student who believes that there are compelling reasons for a specific regulation to be waived or modified, the student should submit

a written petition to the Dean of the Graduate School , Room 2125, Lee Building, explaining the facts and issues that bear on the case. In all instances, the petition must be signed by the student's Graduate Director and, if the petition involves a course, by the course instructor. If these individuals recommend approval, in writing, the petition is then forwarded to the Office of the Dean of the Graduate School for consideration. Forms for Petitions for Waivers of Regulation (http://gradschool.umd.edu/forms) are available on our Graduate School website.

Application for Graduation

During the academic year, applications for graduation must be filed with the Office of the Registrar (http://registrar.umd.edu) within the first ten days of the semester in which the candidate expects to obtain a degree. During the summer session, the application must be filed during the first week of the second summer session. Exact dates are noted for each semester and the summer sessions in the *Schedule of Classes* and on the Graduate School website (http://gradschool.umd.edu/calendar/deadlines). Failure to meet specific deadlines may result in a delay of one or more semesters before graduation. In addition, the Thesis and Dissertation Manual (http://gradschool.umd.edu/students/academic-progress/thesis-and-dissertation-filing) contains a time line for completion of the master's or doctoral degree. If for any reason students do not graduate at the end of the semester in which they have applied for the diploma, the application will automatically transfer to the following semester.

Academic regalia are required of all candidates at commencement exercises. Those who so desire may purchase or rent caps and gowns at the University of Maryland student supply store. Orders must typically be filed eight weeks before the date of Commencement at the University Book Center in the Stamp Student Union.

Arbitrary and Capricious Grading Policies

Policy and Procedures for Review of Alleged Arbitrary and Capricious Grading in Courses

Arbitrary and capricious grading is constituted by the assignment of a course grade to a student on some basis other than performance in the course, or the assignment of a course grade to a student by unreasonable application of standards different from standards that were applied to other students in that course, or the assignment of a course grade by a substantial and unreasonable departure from the instructor's initially articulated standards.

A student who believes he or she has received an improper final grade in a course should inform the instructor promptly. The instructor will meet with the student at a mutually convenient time and place within ten working days of receipt of the information. The purpose of the meeting is to attempt to reach a resolution.

If the instructor has left the University, is on approved leave, or cannot be reached by the student, the student should contact the Department Chairperson. The Department Chairperson, or a designee, will meet with the student as described above to attempt to resolve the problem.

If these meetings (known as the informal process) do not resolve the problem, the student may initiate a formal appeal. This appeal must be made in writing to the Dean of the Graduate School and must contain: the course title and number; the instructor's name; and a statement detailing why the grade is believed to be arbitrary and capricious as defined in this policy, and providing all relevant supporting evidence. The appeal must be received in the Dean's Office within twenty (20) days of the first day of instruction of the next semester (excluding summer and winter semesters.) If these criteria are met, the Dean will institute a formal procedure.

Formal Procedures

Each academic unit will have a standing committee of two tenured professors and two graduate level students to hear appeals of arbitrary and capricious grading. The appeal will be heard within the academic unit offering the course. If the instructor of the course is a member of the committee, that instructor will be replaced by an alternate designated by the Department Chairperson.

Each written appeal is to be reviewed by the entire committee for a decision by the majority. The committee will either dismiss the appeal, or move it forward. Grounds for dismissal are: the student has submitted the same complaint to any other grievance procedure; the allegations, if true, would not constitute arbitrary and capricious grading; the appeal was not timely; or the informal process has not been exhausted. If the appeal is dismissed, the committee will notify the student in writing within ten days of the decision, and will include the reason or reasons for the dismissal.

If the appeal is not dismissed, the committee will submit a copy of the appeal to the instructor. The instructor must reply in writing to the committee within ten days. If, based on the instructor's reply, the committee feels there is a viable solution, that solution should be pursued with the student and the instructor. If no solution is reached, the committee shall hold a fact-finding meeting with the student and the instructor. It is to be non-adversarial and informal, with neither party represented by an advocate.

Witnesses may be asked to make statements to the committee if the committee is informed prior to the meeting. The meeting will not be open to the public. The committee will meet privately at the close of the fact-finding meeting to decide whether a majority believes the evidence supports the allegation of arbitrary and capricious grading beyond a reasonable doubt. The committee will notify the student, the instructor, and the Dean of the Graduate School of the decision in writing within five days of the meeting.

The committee has the authority to take any action that it believes will bring about substantial justice, including but not limited to directing the instructor to grade the student's work anew, directing the instructor to administer a new final exam or paper, directing the cancellation of the student's registration in the course, and directing the award of a grade of "pass" in the course. The committee does not have the authority to assign a letter grade for the course or reprimand or take disciplinary action against the instructor.

The decision of the committee is final, and binding on both parties. The decision may not be appealed to any other body within the University of Maryland or the University of Maryland System.

The Dean of the Graduate School will be responsible for implementing the decision of the committee.

For more information, please review The University Policy on Arbitrary and Capricious Grading (http://www.president.umd.edu/administration/policies/section-iii-academic-affairs/iii-120a).

Policy and Procedures for Appeals of Alleged Arbitrary and Capricious Grading of Doctoral Qualifying Examinations

The University procedures for reviewing alleged arbitrary and capricious grading of doctoral qualifying examinations envision a multi-step process. (Qualifying examinations are defined as any examinations, oral or written, that are necessary, but not sufficient, for admission to candidacy for a graduate degree.) Prior to filing a formal written appeal, the student must engage in an informal attempt to resolve the problem directly with the Chair of the Examination Committee. The Graduate School 's Ombudsperson may be called upon to facilitate resolution if both parties agree. If these informal efforts fail, then the student may file a formal appeal to the Dean of the Graduate School. When such an appeal is received by the Graduate School, the Program will be notified and will receive a copy of the appeal letter. An Appeal Committee of faculty and students established by the Department/Program will then meet to conduct the formal appeal process.

The formal appeal process consists of four phases. In the first phase, the Committee evaluates the student's written appeal and determines, according to certain established criteria, whether it should be dismissed on procedural grounds or whether the process should move forward to the next phase. In the second phase, the appeal is sent to the Chair of the Examination Committee for a written response.

In the third phase, the Appeal Committee decides if there may be a viable informal solution and if so, pursues it with both the student and the graduate program. If the Appeal Committee does not feel that such an attempt would be feasible or if the effort is unsuccessful, the process moves to phase four, which is the fact-finding phase.

In the fact-finding phase, the student, the graduate director, and a member of the examination committee meet with the Appeal Committee. Each party may make statements to the Appeal Committee and may call witnesses. This phase, however, is both informal and non-adversarial, and neither side may be represented by an advocate. After hearing both sides, the Appeal Committee meets privately to consider the evidence and decide whether the evidence offered in support of the allegation of arbitrary and capricious grading is clear and convincing. If the Appeal Committee supports the allegation, it then has several options for resolving the issue. Whatever the decision of the Appeal Committee, it is binding on both parties and is final; i.e., it may not be appealed elsewhere in the University of Maryland or elsewhere within the University System of Maryland.

Qualifying examinations are defined as any examinations, oral or written, that are necessary, but not sufficient, for admission to candidacy for a graduate degree. Arbitrary and capricious grading applies only to the grade assigned in a doctoral qualifying examination. Arbitrary and capricious grading is defined as any of the following:

a) The assignment of a grade to a student on some basis other than performance in the qualifying examination; or

b) the assignment of a qualifying examination grade to a student by an unreasonable application of standards different from standards that were applied to other doctoral students, where an objective comparison of students is possible; or

c) the assignment of an examination grade by a substantial and unreasonable departure from the graduate program's or the Examination Committee's initially articulated standards or requirements for the doctoral qualifying examination.

The Informal Appeal Process

Before proceeding to a formal appeal, the student should contact the Chair of the Examination Committee and meet, at least once, at some mutually convenient time and place in an attempt to resolve the issue or issues. This meeting should take place within 10 campus business days of the Examination Committee Chair receiving the informal appeal from the student. Campus business days do not include Saturdays, Sundays, and official campus holidays.

If the Examination Committee Chair has left the university, is on approved leave, or cannot be reached by the student, the student should contact the Department/Program Chair. The Department/Program Chair, or a faculty member designated by the Chair, will to attempt to resolve the issue.

The Ombudsperson for Graduate Students and/or the Graduate Director may be called upon to facilitate resolution if both parties agree.

The Formal Appeals Process

If the informal process does not resolve the issue, the student must file a written appeal. The written appeal must be received by the Office of the Dean of the Graduate School within 20 campus business days after the first day of instruction of the following semester.

The deadline for appeals of a spring-semester examination, or an examination taken during either semester of summer session, is the 20th campus business day after the first day of instruction of the following fall semester. Appeals of a fall semester examination or a winter term examination must be made by the 20th campus business day after the first day of instruction of the following spring semester.

The letter of appeal should contain the Examination Committee Chair(s) name, the Graduate Director(s) name, the date(s) of the examination, and an explanation of why the student believes the examination result was arbitrary and capricious, as defined by the policy. Any relevant supporting evidence should be included with the letter.

Each Program should have a standing committee to hear appeals of arbitrary and capricious grading of doctoral qualifying examinations. The Appeal Committee may be the same committee formed within the Program to hear appeals of arbitrary and capricious course grades. This committee should generally be formed specifically for the purpose of hearing appeals of arbitrary and capricious grading and not a subcommittee of any other committee. The Appeal Committee should normally be appointed at the start of the academic year. The terms of its members should be for at least one academic year.

The Appeal Committee should be composed of two tenured faculty and two graduate students appointed by the Graduate Director of the Program offering the course. In addition, the Dean of the College will appoint one additional member to the Appeal Committee who is a member of the Dean's Office staff and who is also a member of the Graduate Faculty. If no such person is available from the Dean's Office staff, the Dean will appoint a committee member from a Department/Program other than that of the appellant's Department/Program within the college.

No member of the student(s Examination Committee may also be a member of the Appeal Committee. In such a situation, a substitute member should be appointed by the Graduate Director.

All actions of the Appeal Committee are by majority vote. In the event that the Appeal Committee, at any stage of the process, is unable to reach a majority decision, the Dean of the College or his/her designee, should cast the deciding vote. In the case of inter-college programs, the participating deans may decide which of them will have responsibility for casting the deciding vote.

The Initial Evaluation Phase

In this phase, the only task of the Appeal Committee is to review the letter of appeal to determine whether the appeal should be dismissed on procedural grounds or moved forward to the next phase. If any of the specified procedural grounds for dismissal are met, the appeal must be dismissed. The procedural grounds for dismissal are as follows: a) The student did not meet with the Examination Committee Chair to resolve the issue informally; or b) the appeal was not timely (i.e., it arrived later than the 20th campus business day after the first day of instruction of the following semester, as specified above); or c) the student has already submitted the same complaint through another grievance procedure; or d) the allegations, if true, would not constitute arbitrary and capricious grading of a qualifying examination.

During this initial evaluation phase, the Appeal Committee should consider only the student's letter of appeal; it should not seek or consider comments or responses from the Examination Committee, or other faculty or students. During this initial evaluation phase, the Appeal Committee is not to decide the truth of the student's allegation(s); it should accept the student's allegations at face value (i.e., assume for the moment the allegations are true.) If, based on its evaluation of the student's letter of appeal, the Appeal Committee decides that one or more of the four procedural grounds for dismissal have been met, the Appeal Committee must dismiss the appeal and the process ends. The Appeal Committee Chair should notify the student, the Examination Committee Chair, the Graduate Director, and the Dean of the Graduate School in writing within 10 campus business days if the appeal is dismissed. The Appeal Committee Chair's letter should include the reasons for the dismissal.

The Examination Committee's Response Phase

If the appeal is not dismissed, the Appeal Committee Chair should promptly submit a copy of the student's written appeal to the Chair of the Examination Committee with a copy to the Dean of the Graduate School . The Chair of the Examination Committee should submit a written response to the Appeal Committee Chair within 10 campus business days of receiving the appeal.

The Dispute Resolution Phase

If, after reviewing the Examination Committee's response, the Appeal Committee feels that a solution may be possible, the Appeal Committee should meet with the student and the Examination Committee, separately and/or jointly, to attempt to resolve the dispute. The dispute resolution phase should not generally have a duration longer than 30 calendar days from receipt of the Examination Committee's written response, unless both Committee Chairs agree in writing to continue for a further, brief, specified period. If the Appeal Committee's resolution efforts are successful, both Committee Chairs should sign a memorandum that states the agreed-upon solution. A copy of this memorandum should be placed in the student's file in the Department/Program and a copy should be sent to the Graduate School and to the student. If resolution by the Appeal Committee either is not attempted or is unsuccessful, the Department/Program Chair, the Graduate Director, the Examination Committee Chair, and the Dean of the Graduate School should be promptly notified, and the process advances to the fact-finding phase.

The Fact-Finding Phase

If a solution is not attempted or is not reached through dispute resolution, the fact-finding meeting should be held promptly thereafter. In addition to the Appeal Committee members, the student and the Chair of the Examining Committee should be in attendance. Either party may invite witnesses to give evidence if the Appeal Committee Chair is notified prior to the meeting. The Chair of the Appeal Committee should generally be given at least 24 hours advance notice of the intention to call witnesses. During the fact-finding meeting, both the student and the Examining Committee Chair may present statements, oral or written, to the Appeal Committee as well as other documentation to support their positions. Neither party may be represented by an advocate of any kind. The meeting will not be open to the public. The Graduate School may send an administrator to observe the proceedings, but this observer should not participate substantively in the proceedings themselves. The meeting is to be both informal and non-adversarial; its purpose is to determine the relevant facts in the matter. At the close of the fact-finding meeting, the Appeal Committee will meet privately to consider the evidence presented. If the majority of the Appeal Committee believes that the student has not provided clear and convincing evidence of the allegation of arbitrary and capricious grading of a qualifying examination as defined above, the appeal must be denied. If the majority of the Appeal Committee believes that there is clear and convincing evidence that supports the allegation of arbitrary and capricious grading, the Appeal Committee will decide which of the various actions within its authority (see below) should be taken. The Appeal Committee Chair should notify the student, the Department/Program Chair, the Examining Committee Chair, the Graduate Director, and the Dean of the Graduate School in writing of the Appeal Committee's decision on the appeal within five campus business days after conclusion of the fact-finding meeting.

The Authority of the Appeal Committee

The Appeal Committee generally has the authority to take any action it believes will bring about substantial justice, except a) it may not direct that a passing grade for the qualifying examination be assigned for the student; and b) it may not reprimand or take disciplinary action against the Examination Committee or any of its members.

The following is a list of possible actions that the Appeal Committee may take. The list is not exhaustive; the Appeal Committee may take other appropriate actions in order to achieve what it believes to be substantial justice.

a) The Appeal Committee may direct the Department/Program that the examination be re-graded by a new Examination Committee from within the Program.

b) The Appeal Committee may direct the Program that the examination be re-graded by a new Examination Committee from outside the Program.

c) The Examination Committee may be directed to administer a new examination.

d) The Appeal Committee may direct that a new Examination Committee be formed from within the Department/Program which will administer and grade an entirely new examination.

e) The composition of the new Examination Committee will be determined by the Appeal Committee in accordance with the prevailing rules of the Program. At the discretion of the Appeal Committee, the new Examination Committee may have one of its members from outside of the University of Maryland .

f) In the event that the qualifying examination was an oral examination, a new oral examination must be administered.

In the event of a combined written/oral qualifying examination, a new oral portion must be administered. The Appeal Committee may direct that this new examination be administered by an Examination Committee that consists of some or all members of the original Examination Committee or an entirely new committee.

The Appeal Committee's Decision

The decision of the Appeal Committee is final and binding on both parties. The decision may not be appealed to any other body within the University of Maryland or within the University System of Maryland. If, as a result of this appeals process, the student's advisor no longer wishes to advise the student, the Graduate Director will act as the student's temporary advisor for a period of not more than six months to allow the student time to find a new advisor. If the Graduate Director is a member of the Examination Committee, this assignment will be carried out by the Department/Program Chair.

Implementation of the Appeal Committee's Decision

The Director of Graduate Studies and the Department/Program Chair will be responsible to the Dean of the Graduate School for implementing the decision of the Appeal Committee.

GRADUATE STUDENT RIGHTS AND RESPONSIBILITIES

It is the policy of the University of Maryland to maintain the campus as a place of study and work for students, faculty, and staff in which all parties are expected to uphold the values of the University by conducting themselves in accordance with University policies and procedures. Such an environment must be free of intimidation, fear, coercion, reprisal, harassment, bullying or other unacceptable behaviors. Graduate students can expect to be treated fairly and with dignity and respect as outlined in the University Non-discrimination Policy and Procedures [VI-1.00(B)].

GRIEVANCE PROCEDURE

The University is an academic and collegial community. Graduate students are subject to a range of policies and procedures relating to academic standards, as well as rules and regulations of behavior set forth by the University and the Office of Student Conduct. Graduate Assistants are subject primarily to the Policy on Graduate Assistantships. If a graduate student believes that they have experienced treatment that is unethical, grossly unjust, uncivil, or otherwise creates a hostile learning or working environment from a faculty member, a staff member, or another student, the student should attempt to resolve the matters locally, collegially, and informally. If the issue has not been resolved to the graduate student's satisfaction or the treatment cannot be stopped through informal means, the graduate student may elect to file a formal grievance.

Limitations

No other University grievance procedure may be used simultaneously or consecutively with this procedure with respect to the same or substantially same issue or complaint, or with issues or complaints arising out of or pertaining to the same set of facts. Neither the University of Maryland Non-Discrimination Policy and Procedures (VI-1.00[B]) nor any other University grievance procedure may be utilized to challenge the actions, determinations, or recommendations of any person(s) or board(s) acting pursuant to these procedures.

Notwithstanding any provision of this Policy to the contrary, the following matters do not constitute the basis for a grievance under this procedure:

1. Policies, regulations, decisions, resolutions, directives and other acts of the Board of Regents of the University System of Maryland, The Office of the Chancellor of the University System of Maryland, and the Office of the President of the University of Maryland;
2. Any statute, regulation, directive, or order of any department or agency of the United States or the State of Maryland; V-1.00(A) page 4
3. Any matter outside the control of the University System of Maryland;
4. Course offerings;
5. The staffing and structure of any academic department or unit;
6. The fiscal management and allocation of resources by the University System of Maryland and the University of Maryland;
7. Any issues or acts which do not affect the complaining party directly;
8. "Class-action" grievances are not permitted under these procedures. Grievances must be presented by individual students. If multiple students file individual grievances on the same matter, a screening or hearing board may, in its discretion, consolidate grievances presenting similar facts and issues, and recommend generally applicable relief as it deems warranted;
9. Under these procedures, there may be no challenge to the award of a specific grade.

Informal Consultation

The graduate student is strongly encouraged but not required to first attempt to resolve the difficulty by discussing the situation with the person/persons (faculty member, the staff member, and/or student) as expeditiously as possible and/or practical. If a satisfactory resolution is not reached, the graduate student should next discuss the situation with the Director of Graduate Studies (or equivalent) and/or the Department Chair (or equivalent). It is expected that these discussions will be kept confidential and not discussed publicly beyond the individuals involved. However, the Director and/or Chair should keep a record of such complaints and report annually to the Graduate Ombuds Office.

Either before or after such discussions, the graduate student may wish to confidentially seek advice from another academic advisor, an assistant or associate dean of their college or of the Graduate School, or the Ombuds Officer for Graduate Students. The graduate student is encouraged to consult with the Ombuds Officer early in the informal discussion process, and must consult with the Ombuds Officer before initiating a formal grievance. The Ombuds Officer is available to all graduate students with questions or concerns related to their graduate experience, including their roles as GAs. The Ombuds Officer provides informal assistance in resolving conflicts and works to promote fair and equitable treatment within the University. The Ombuds Officer works confidentially within the scope of the law. The purpose of the Ombuds Officer is to ensure that the graduate student's voice is heard and that problems receive prompt and impartial attention. The Ombuds Officer does not advocate for an individual; rather, the Ombuds Officer advocates for a fair process that promotes the University's commitment to excellence in graduate education and in the graduate student experience. Queries may be directed to Ombuds Officer for Graduate Students, The Graduate School, 2103 Lee Building, phone (301) 405-3132.

Formal Grievance

These conflicts should be ideally addressed first by the Director of Graduate Studies (or equivalent) and then by the Department Chair (or equivalent) according to the process and appropriate remedies and

disciplinary actions set by the grievance policy of the college or school. If the conflict cannot be resolved at this level and/or the graduate student does not feel comfortable disclosing an issue to one or more of these parties, the grievance shall be formally filed with the dean of the college or school. The dean will initiate the grievance process created within the college or school to address such issues. The process is to remain confidential and not publicly discussed beyond the parties involved. If the Director of Graduate Studies or Chair or Dean is the subject of the accused, said person will recuse him or herself.

In cases in which this process is not effectively resolved, the graduate student may file an appeal to the Graduate School. If the grievance is with the Director of Graduate Studies or Dean, the appeal may be made directly to the Dean of the Graduate School.

Formal Appeal Process

If a satisfactory resolution has not been achieved following procedures at the unit and/or college/school level, either party may initiate an appeal process with the Graduate School by sending a written appeal to the Dean of the Graduate School. To be considered, it must be received by the Graduate Dean within 30 calendar days from the announcement of the decision at the level of the school or college. All parties will be notified of this deadline at the time of the announcement of the college/school decision. Under exceptional circumstances, the deadline may be extended at the discretion of the Graduate Dean.

1. The appeal must be signed and:
    a. Contain a clear description of the facts giving rise to the grievance;
    b. Provide a clear explanation of why the party filing the appeal found the outcome(s) of the unit and/or college/school level grievance proceedings unsatisfactory;
    c. Set forth the desired remedy; and
    d. Elect to have the Graduate Dean decide the grievance either:
        i In the manner described in Paragraph 2.b below; or
        ii Following receipt of a recommendation from a three-person panel appointed by the Graduate Dean to consider the matter.
2. Upon receipt of the formal appeal, the Graduate Dean (or designee) will:
    a. Share the letter of appeal with the Dean of the appropriate college or school and solicit a written response from the Department Chair and/or College Dean.
    b. Offer to meet with the parties involved, either individually or together, before reaching a decision. The Graduate Dean shall confidentially consult with the Academic Dean, Associate Provost for Faculty Affairs, and such other persons as the Graduate Dean believes may be knowledgeable about the policies, practices and issues involved. The Graduate Dean shall endeavor to convey a written decision and, where appropriate, the remedy, to the parties involved within 30 calendar days of receipt of the letter of appeal; or
    c. If the grieving party is either a graduate student or faculty member and elects to have a panel, the Graduate Dean will appoint two graduate faculty (one of whom shall serve as chair of the panel) and one graduate student, each familiar with the graduate student's discipline but not from the student's or other parties in the grievance program or department, to confidentially review the matter and make a recommendation to the Graduate Dean. If the grieving party is a staff member, the Graduate Dean will appoint one faculty (serving as chair of the panel), one staff person, and one graduate student, not from the staff's or other parties in the grievance program or department, to confidentially review the matter and make a recommendation to the Graduate Dean. The panel should conduct its review in an impartial and unbiased manner. The Graduate Dean will provide the panel with the letter of formal grievance and written responses from the Department Chair (or equivalent) and/or College Dean. The panel shall offer to meet with the parties involved, either individually or together, as well as confidentially consult other people as appropriate in determining its recommendation. The panel shall endeavor to convey its written report recommendation to the Graduate Dean within 30 calendar days of the receipt of the letter of appeal; the Graduate Dean shall endeavor to convey a written decision and, where appropriate, the remedy, to the parties involved within 15 calendar days of receipt of the panel's report. The written report of the panel will contain a statement of the issues, the panel's findings of fact, the controlling policy provisions, the panel's assessment regarding the merits of the grievance, and a recommended disposition of the grievance, including a suggested remedy and/or disciplinary action(s).

The decision of the Graduate Dean regarding the merits of the grievance and, where appropriate, the remedy/disciplinary action shall be final. The Dean of the Graduate School will convey the final decision to the parties involved as well as to the Associate Provost for Faculty Affairs for possible other actions.

General Principles Controlling Formal Grievance Procedures

These procedures are not intended to mimic a courtroom and be adversarial in nature. Rather, they are formal in the meaning of offering a structured method to investigate, weigh, and remedy differences and prevent future occurrences of such action. They are designed to preserve collegiality and minimize injury to the student-faculty, student-student, student-staff relationships. Because grievances, if not made known or not considered expeditiously, may threaten the learning experience and/or mental health of the parties involved, graduate students, faculty, and administrators share responsibility to deal with them promptly. It is also expected that proceedings are conducted confidentially in order to protect the parties involved, to minimize damage to reputations and relationships, and to prevent the occurrence of retaliatory actions. Experience has shown that the following rules promote the orderly and efficient disposition of grievances. Accordingly, they shall be observed:

1. There is a burden of proof. The graduate student has the responsibility of convincing the Graduate Dean or panel of four things: a) that the policies of the University have not been followed; b) that the graduate student has been adversely affected; c) that the actions and activities of the parties involved have long-term impacts; and d) and that the requested remedy is appropriate.
2. All matters to be considered in support or defense of a grievance should be made known as early in the informal process as possible. In both the informal and formal process, it is the responsibility of the graduate student and faculty member (or student or staff member) to produce in a timely way the evidence they each wish considered, including any documents and witnesses.
3. The Grievance Procedure is not a trial. Formal rules of evidence commonly associated with criminal and civil trials may be counterproductive in an academic investigatory process and shall not be applied. The Academic Dean, Graduate Dean, and three-member panel shall follow the rules of confidentiality and privilege, but shall otherwise accept for consideration all matters which reasonable persons would accept as having probative value in the conduct of

their affairs, giving it such weight as they consider proper. Unduly repetitive, irrelevant, or personally abusive material, however, should be excluded. They may also consider matters within the common knowledge and experience of University faculty, including published policies of the University System of Maryland and the University of Maryland.

4. The graduate student may be assisted at any meeting by an advisor, who must be a registered, degree-seeking graduate student at the University or a current member of the University Faculty or staff. Although the graduate student is expected to take an active role in all meetings, the advisor may help with the presentation of arguments and evidence.
5. The University has in place other grievance procedures and administrative processes designed to address specific types of claims. These are meant to be the exclusive avenue for review and redress. Grievances that by their subject matter may be considered under other established institutional procedures must be brought under those procedures and may not be considered under this formal procedures. Matters pertaining to the general level of wages, wage patterns, fringe benefits, or to other broad areas of financial management and staffing are not grievable under this process. Matters expressly excluded from consideration under other procedures may not be grieved under these formal procedures.
6. A decision may not be made at any step that conflicts with or modifies a policy, regulation, or grant of authority approved by the Board of Regents, the Chancellor, the President, the Provost, or the University Senate or with any applicable Federal or State of Maryland law.
7. Currently enrolled University of Maryland graduate students may initiate a formal grievance. A student that withdrew from the University or was dismissed from the University has 30 days following the date of withdrawal or dismissal to initiate a formal grievance. The Graduate Dean can grant an extension depending on the circumstances. The grievance must pertain to the graduate student personally, not those of another graduate student. Group grievances are permitted; similar grievances may be consolidated and processed together as a single issue.
8. Because it is critical to address potentially corrosive grievances sooner than later, and because the remedies and disciplinary actions available are prospective, the time requirement established for initiating a formal grievance is necessary to the effective administration of the graduate program. Unless otherwise agreed in advance among the graduate student, the faculty member (or other parties), and the Graduate Dean, strict adherence to them is a condition of review and appeal under these procedures. Time requirements are measured from the first occurrence of an event; "continuing" wrongs are not recognized for the purpose of satisfying time requirements.
9. The Graduate Dean may delegate such parts of these responsibilities as the Dean deems reasonable and efficient, provided the final decision and any remedy must be reviewed and approved by the Dean personally.
10. The University and Graduate School should make all conduct and corresponding grievance policies and processes clearly visible and accessible by graduate students, faculty and staff. The Dean of the Graduate School will provide a summary report of grievances filed and actions taken under this policy to the Graduate Council.

Graduate School Services

The Office of Graduate Diversity and Inclusion (OGDI)

The Office of Graduate Diversity and Inclusion is dedicated to fostering a supportive University environment for graduate students from under-represented and under-served groups. OGDI provides campus leadership for identifying, recruiting, retaining, and graduating a diverse graduate student body. The Office's programs and services aim to attract new students, to build a collaborative and cooperative community, and to promote professional development among graduate students to ensure academic success. It's initiatives include, but are not limited to: **conducting student recruitment activities**, including campus visits, supporting summer undergraduate research programs; **building a supportive community** through collaboration with graduate student organizations; **sponsoring programs and activities designed to foster professional development**, including workshops and seminars on academic and research skills, retention initiatives, and preparing graduate students for the professoriate and other careers. The Office also assists the University's various colleges and departments in creating an environment supportive of the academic success of historically under-represented and under-served graduate students. The Office can be reached at 2100B Lee Building, 301-405-0763, and by visiting the OGDI website (https://gradschool.umd.edu/ogdi).

Ombuds Office for Graduate Students

The Ombuds Office for Graduate Students (https://gradschool.umd.edu/about-us/ombuds-office) seeks to ensure that the graduate student voice is heard and that problems receive impartial attention. The Ombuds Office is available to all graduate students with questions or concerns related to their graduate experience. The Ombuds Office provides confidential, informal, and independent assistance to resolve conflicts, and promotes fair and equitable treatment within the University. The office can be reached at 2103 Lee Building, 301-405-3132.

Graduate Legal Aid Office

The Graduate Legal Aid Office provides free legal advice, referrals, and assistance to currently registered University of Maryland graduate students. Staff members give general legal advice on a wide variety of matters, including landlord-tenant issues, consumer problems, traffic accidents, uncontested divorces, and University-related matters. The Office provides direct legal assistance in routine matters, but cannot sue on behalf of students or represent them in court. The Office is staffed eight hours a week for student interviews; staff members see students on a walk-in basis and by appointment. Walk-in and appointment schedules are posted on the Office door. The Office cannot handle disputes between graduate students (though the Ombudsperson for Graduate Students may be consulted for assistance in these disputes) and does not provide emergency services. For more information, consult the Graduate Student Legal Aid Office website (http://umddepartments.orgsync.com/org/gradlegalaid/home).

English Editing for International Graduate Students

The English Editing for International Graduate Students (EEIGS) program offers editing services for international graduate students who must present required seminar papers, theses and dissertations in English. This program is staffed by volunteers from the University's "Retired

Volunteer Service Corps" and the Golden I. D. Group, and by volunteers from other University and non-University sources. These services are free.

The EEIGS program operates as follows:

- The names and telephone numbers of volunteer editors on whom students may call may be obtained by visiting the EEIGS website (http://www.english.umd.edu/academics/writingcenter/graduate/international).
- The student will be responsible for contacting a volunteer editor to arrange for the editing services. If an arrangement does not work out satisfactorily, either the student or the volunteer editor may discontinue it. The student may then seek another volunteer editor.
- The student should allow a reasonable amount of time for the editing services. Documents cannot be edited on very short notice.
- Editing services are expected to take place on the University of Maryland campus. The student will be responsible for finding working space (for example, an empty classroom or office in the student's department).
- The student is expected to inform the Director of Graduate Studies of the department in which he or she is majoring about the aid being received through this program.

Graduate students and other members of the University of Maryland community may also offer English language services for a fee. Graduate students in the Department of English who are available for this service, for example, can be contacted through the Director of Graduate Studies (english-grad@umd.edu), Department of English, 3101 Susquehanna Hall.

Health Insurance

Because the service provided by the Health Center is limited and many students do not have adequate health insurance coverage, a voluntary group insurance policy (United Health Care) is available to graduate students. This policy provides benefits at reasonable rates for hospital, surgery, emergency, laboratory, and x-ray services; some coverage for mental health; and contains a major hospital provision. Students may elect to have family coverage. For information on the United Health Care plan, please visit the University Health Center website (http://www.health.umd.edu/insurance). United Health Care offers online enrollment at http://www.firststudent.com/.

Teaching, research, and graduate assistants are eligible for the State Employee Insurance Plan options. Further information can be obtained from the student's graduate program payroll and benefits coordinator or the University Human Relations' Benefits Office (https://uhr.umd.edu/benefits).

Graduate fellows can apply for health insurance coverage through United Health as well. Effective Fall Semester 2005, the Graduate School will provide a reimbursement of 50% of the United Health insurance premium for individual coverage to full-time graduate students who are supported on full fellowships funded by the Graduate School through the University and Dean's Fellowship program. Subsidy of coverage for dependents will not be available. Funding for fellows' health insurance reimbursement is limited and will be provided on a first-come, first-served basis. To obtain more information, please visit our Graduate School website (https://gradschool.umd.edu/funding/fellowship-information/health-insurance-information).

Appendices

Topics for which additional references can be found:

1. Policy for Student Residency Classification for Admission, Tuition and Charge-Differential Purposes
   Admissions Policies (p. 1038)
   Residency Classification Office (http://registrar.umd.edu/resreclass.html)
2. Academic Integrity
   Academic Record (p. 1059)
   III-1.00 Policy on Faculty, Student and Institutional Rights and Responsibilities for Academic Integrity (http://www.usmh.usmd.edu/regents/bylaws/SectionIII/III100.html)
   III-1.00(A) UMCP Code of Academic Integrity (https://president.umd.edu/administration/policies/section-iii-academic-affairs/iii-100a)
3. Code of Student Conduct and Annotations
   Graduate Catalog (p. 14)
   V-1.00(B) UMCP Code of Student Conduct (https://www.president.umd.edu/administration/policies/section-v-student-affairs/v-100b)
4. Human Relations Code
   Graduate Catalog (p. 14)
   Office of Legal Affairs (https://www.president.umd.edu/office-general-counsel)
   VI-1.00(B) University of Maryland Human Relations Code (https://www.president.umd.edu/administration/policies/section-vi-general-administration/vi-100b)
5. Campus Policy and Procedures on Sexual Harassment
   Graduate Catalog (p. 14)
   VI-1.20 University of Maryland System Policy on Sexual Harassment (http://www.usmh.usmd.edu/regents/bylaws/SectionVI/VI120.html)
   VI-1.20(A) University of Maryland Sexual Misconduct Policy and Procedures (https://www.president.umd.edu/administration/policies/section-vi-general-administration/vi-160a-0)
   VI-1.30 University of Maryland System Policy on Sexual Assault (https://www.president.umd.edu/administration/policies/section-vi-general-administration/vi-160a-0)
   VI-1.30(A) UMCP Procedures on Sexual Assault (https://www.president.umd.edu/administration/policies/section-vi-general-administration/vi-160a-0)
6. UMCP Graduate Policy and Procedures for Review of Alleged Arbitrary and Capricious Grading
   Graduate Catalog (p. 14)
   III-1.20 Policy for Review if Alleged Arbitrary and Capricious Grading (http://www.usmd.edu/regents/bylaws/SectionIII/III120.html)
   III-1.20(A) UMCP Procedures for Review of Alleged Arbitrary and Capricious Grading--Graduate Students (https://www.president.umd.edu/administration/policies/section-iii-academic-affairs/iii-120a)
   Procedures Guide for Conducting Appeals of Alleged Arbitrary and (p. 1074)Capricious Grading of Doctoral Qualifying Examinations
7. University of Maryland at College Park Policy on Copyrights and Patents
   Graduate Catalog - Master's Students (p. 1063)
   Graduate Catalog - Doctoral Students (p. 1066)
   IV-2.20 Policy on Classified and Proprietary Work (http://www.usmd.edu/regents/bylaws/SectionIV/IV220.html)
   IV-3.00 Policy on Patents (http://www.usmh.usmd.edu/regents/bylaws/SectionIV/IV300.html)

IV-3.00(A) UMCP Procedures on Patent and Technology Transfer (http://www.usmh.usmd.edu/regents/bylaws/SectionIV/IV300.html)
IV-3.10 Policy in Copyrights (http://www.usmh.usmd.edu/regents/bylaws/SectionIV/IV310.html)

8. Class Exercises That Involve Animals
   UM Policy (https://research.umd.edu/IACUC)
9. Animal Care and Use Program
   UM Policy (https://research.umd.edu/IACUC)
10. Research Involving Human Subjects
    Graduate Catalog - Master's Students (p. 1063)
    Graduate Catalog - Doctoral Students (p. 1066)
    IV-2.10 University if Maryland System Policy in Human Subjects of Research (https://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/IV-210.pdf)
11. Guidelines for Combined Bachelor's/Master's Programs
    Graduate Catalog (p. 14)
    III-2.20(A) UMCP Policy and Guidelines for Combined Bachelor's/Masters Programs (https://catalogundergraduate.umd.edu/catalog/index.cfm/show/content.section/c/27/ss/1585/s/1507)
    Policy on Combined Bachelor's/Master's Programs (http://www.usmh.usmd.edu/regents/bylaws/SectionIII/III220.html)
12. Inter-Institutional Registration
    Graduate Catalog (p. 14)
    III-2.41 Policy on Graduate Student Inter-Institutional Registration (http://www.usmh.usmd.edu/regents/bylaws/SectionIII/III241.html)
13. University Policy on Disclosure of Student Records
    III-6.30 Policy on Confidentiality and Disclosure of Student Records (https://www.sis.umd.edu/ferpa/ferpa_policy.htm)
    III-6.30(A) UMCP Policy and Procedures on the Disclosure of Student Education Records (https://www.president.umd.edu/administration/policies/section-iii-academic-affairs/iii-630a)
14. Immunization Policy
    Graduate Catalog (p. 14)
    V-1.00(H) UMCP Immunization Policy (https://www.president.umd.edu/administration/policies/section-v-student-affairs/v-100h)
15. Policy on Student Alcohol and Other Drug Abuse
    UMCP Policy on Student Alcohol and Other Drugs Abuse (http://www.health.umd.edu/sites/default/files/AOD%20Policy%20And%20Resource%20Guide%202014-2015.pdf)
16. Smoking Policy and Guidelines
    UMCP Smoking Policy and Guideline (https://umdrightnow.umd.edu/news/university-maryland-goes-smoke-free)

Resources

Research Centers & Institutes

- Research Centers, Institutes, Laboratories, Galleries, and Bureaus (https://www.umd.edu/centers-and-institutes)
- Centers and Institutes by College or Division (https://www.provost.umd.edu/Centers/indexcollege.html)
- Office of Sustainability: Research Centers (https://sustainability.umd.edu/education-research/research-centers)

Services

- Graduate Student Support Services (https://gradschool.umd.edu/students/#student-support-services)
- University Health Center (http://www.health.umd.edu)
- University Human Resources (https://uhr.umd.edu)
- Office of Student Financial Services and Cashiering (https://billpay.umd.edu)
- Office of Financial Aid (https://www.financialaid.umd.edu)
- Office of the Registrar (http://registrar.umd.edu)
- Department of Transportation (http://dots.umd.edu)
- Graduate Student Legal Aid Office (http://umddepartments.orgsync.com/org/gradlegalaid)
- International Student and Scholar Services (http://globalmaryland.umd.edu/offices/international-students-scholar-services)
- Disability Support Service (https://www.counseling.umd.edu/ads)
- Dining and Housing Services (https://www.studentaffairs.umd.edu/dining-housing)
- Family Care Resources (https://uhr.umd.edu/benefits/family_care)

Campus Engagement

- Leadership and Community Service-Learning (http://thestamp.umd.edu/leadership_community_service-learning)
- Multicultural Involvement and Community Advocacy (http://thestamp.umd.edu/multicultural_involvement_community_advocacy)
- University Recreation and Wellness (https://recwell.umd.edu)
- Graduate Student Life (http://thestamp.umd.edu/graduate_student_life)
- Veteran Student Life (http://thestamp.umd.edu/veteran_student_life)
- Graduate Student Government (http://umd.orgsync.com/org/gsg)
- Student Organizations (http://orgsync.umd.edu/browse_student_organizations)

ABOUT THE UNIVERSITY

- Academic Calendars (p. 1084)
- Accreditation (p. 1086)
- University Administration and Deans (p. 1087)

ACADEMIC CALENDARS

All undergraduate programs, and most graduate programs, follow the semester calendar. Some graduate programs follow the 12-week term calendar. Consult the individual department or program for the appropriate calendar to use. For current year academic deadlines and other scheduling information, see Academic Deadlines (http://www.registrar.umd.edu/deadlines.html).

- Semester Calendar (p. 1084)
- 12-Week Term Calendar (p. 1084)

Semester Calendar 2018-2019

Fall Semester - 2018

Event	Date
First Day of Classes	August 27 (Monday)
Labor Day	September 3 (Monday)
Thanksgiving Recess	November 21- 25 (Wednesday-Sunday)
Last Day of Classes	December 10 (Monday)
Reading Day	December 11 (Tuesday)
Final Exams	December 12-18 (Wednesday-Tuesday)
Commencement - Main/College/ Department Ceremonies[1]	December 18 (Tuesday)
Commencement - College/ Department Ceremonies[1]	December 19 (Wednesday)

[1] See http://commencement.umd.edu for any updates.

Winter Term - 2019

Event	Date
Classes Begin	January 2 (Wednesday)
Dr. Martin Luther King Holiday	January 21 (Monday)
Classes End	January 22 (Tuesday)

Spring Semester - 2019

Event	Date
First Day of Classes	January 28 (Monday)
Spring Break	March 17-24 (Sunday-Sunday)
Last Day of Classes	May 14 (Tuesday)
Reading Day	May 15 (Wednesday)
Final Exams	May 16-22 (Thursday-Wednesday)
Commencement - College/ Department Ceremonies[1]	May 23 (Thursday)
Commencement - Main Ceremony and College/ Departmental Ceremonies [1]	May 24 (Friday)
Commencement - College/ Department Ceremonies[1]	May 25 (Saturday)

[1] See http://commencement.umd.edu for any updates.

Summer Term - 2019

Event	Date
Sessions I and I-A Begin	May 28 (Tuesday)
Session I-A Ends	June 14 (Friday)
Session I-B Begins	June 17 (Monday)
Independence Day Holiday	July 4 (Thursday)
Sessions I and I-B End	July 5 (Friday)
Sessions II and II-C Begin	July 8 (Monday)
Session II-C Ends	July 26 (Friday)
Session II-D Begins	July 29 (Monday)
Sessions II and II-D End	August 16 (Friday)

All dates are subject to change. Updates and future academic calendars can be viewed at https://www.provost.umd.edu/calendar/.

12-Week Term Calendar 2018-2019

Fall Term - 2018

Event	Date
First Day of Classes	August 27 (Monday)
Labor Day	September 3 (Monday)
Last Day of Classes	November 16 (Friday)

Winter Term - 2018

Event	Date
First Day of Classes	November 26 (Monday)
Winter Break	December 25-January 1 (Tuesday-Tuesday)
Dr. Martin Luther King Holiday	January 21 (Monday)
Last Day of Classes	February 15 (Friday)

Spring Term - 2019

Event	Date
First Day of Classes	February 25 (Monday)
Spring Break	March 17-24 (Sunday-Sunday)
Last Day of Classes	May 17 (Friday)

Summer Term - 2019

Event	Date
First Day of Classes	May 28 (Tuesday)
Independence Day Holiday	July 4 (Thursday)
Last Day of Classes	August 16 (Friday)

All dates are subject to change. Updates and future academic calendars can be viewed at https://www.provost.umd.edu/calendar/.

ACCREDITATION

The University of Maryland, College Park is accredited by the Middle States Commission on Higher Education (MSCHE), http://www.msche.org, under the authority of the U.S. Department of Education. In addition, individual colleges, schools, and departments are accredited by a number of other groups:

Accreditors Approved by the U.S. Secretary of Education

- American Association for Marriage and Family Therapy, Commission on Accreditation for Marriage and Family Therapy Education
- Academy of Nutrition and Dietetics, Accreditation Council for Education in Nutrition and Dietetics
- American Psychological Association, Committee on Accreditation
- American Speech-Language-Hearing Association, Council on Academic Accreditation in Audiology and Speech-Language Pathology
- American Veterinary Medical Association, Council on Education
- Council on Education for Public Health
- National Association of Schools of Dance, Commission on Accreditation
- National Association of Schools of Music, Commission on Accreditation
- Commission on English Language Program Accreditation

Other Accreditors

- American Library Association (ALA)
- Association to Advance Collegiate Schools of Business (AACSB)
- Council for the Accreditation of Educator Preparation (CAEP)
- Accreditation Board of Engineering and Technology (ABET)
- Accrediting Council on Education on Journalism and Mass Communications (ACEJMC)
- Institute of Food Technologists
- Landscape Architecture Accreditation Board (LAAB)
- Maryland State Department of Education (MSDE)
- National Architectural Accrediting Board (NAAB)
- National Association of Schools of Public Affairs and Administration
- Planning Accreditation Board

Evaluated Rather Than Accredited

- Maryland Sea Grant College (National Sea Grant Review Panel)
- Water Resources Center (United States Department of the Interior, U.S. Geological Survey)

For more information about Accreditation see http://www.provost.umd.edu/Academic_Planning/Accreditation.htm.

UNIVERSITY ADMINISTRATION AND DEANS

ADMINISTRATION

President **Wallace D. Loh**

Senior Vice President and Provost **Mary Ann Rankin**

Vice President for Student Affairs **Linda Clement**

Vice President for Administration and Finance **Carlo Colella**

Vice President for Research **Laurie Locascio**

Vice President and General Counsel **Michael Poterala**

Vice President for University Relations **Jackie Lewis**

DEANS

Dean of the College of Agriculture and Natural Resources **Craig Beyrouty**

Interim Dean of the School of Architecture, Planning, and Preservation **Donald Linebaugh**

Dean of the College of Arts and Humanities **Bonnie Thornton Dill**

Dean of the College of Behavioral and Social Sciences **Gregory Ball**

Dean of the Robert H. Smith School of Business **Alexander Triantis**

Dean of the College of Computer, Mathematical, and Natural Sciences **Amitabh Varshney**

Dean of the College of Education **Jennifer King Rice**

Dean of the A. James Clark School of Engineering **Darryll J. Pines**

Associate Provost and Dean of The Graduate School **Steve Fetter**

Dean of the College of Information Studies **Keith Marzullo**

Dean of the Philip Merrill College of Journalism **Lucy Dalglish**

Dean of the School of Public Health **Boris Lushniak**

Dean of the School of Public Policy **Robert Orr**

Associate Provost and Dean for Undergraduate Studies **William A. Cohen**

Interim Dean of University Libraries **Babak Hamidzadeh**

Interim Associate Dean and Chair, Department of Veterinary Medicine, Maryland Campus **Xiaoping Zhu**

Division of Academic Affairs

1119 Main Administration Building
301-405-5252
provost@umd.edu
www.provost.umd.edu

Mary Ann Rankin, Senior Vice President and Provost

The Senior Vice President and Provost is the chief academic officer of the university with responsibility for guiding the academic development and direction of the institution in accordance with the University's mission. As Senior Vice President, the Provost has budgetary responsibility for campus academic programs and resources and works directly with the President on campus-wide resource allocation. The Provost oversees the development, review, and implementation of all academic policies and regulations; consults closely with the University Senate and other faculty advisory groups on academic programs and policies; and serves as liaison with other university divisions in strategic and long-range planning. The deans of the 12 academic colleges and schools report to the Provost as do the deans for Undergraduate Studies, of the Graduate School, and of the University Libraries. The director of the Institute for Bioscience and Biotechnology Research and the Executive Director of the Universities at Shady Grove, both situated in Rockville, also report to the Provost. Other major academic administrative offices that report to the Provost include: Academic Planning and Programs; Diversity and Inclusion; Faculty Affairs; Enrollment Management; Institutional Research, Planning, and Assessment; International Affairs; Finance and Personnel; Records, Registration, and Extended Studies; the Teaching and Learning Transformation Center; and the Academy for Innovation and Entrepreneurship.

Division of Administration and Finance

2119 Main Administration Building
301-405-1105
vpaf@umd.edu
vpaf.umd.edu

Carlo Colella, Vice President, Administration and Finance

The Division of Administration and Finance develops and maintains the university's infrastructure and services. Our eight units support the University of Maryland's mission of education, research, and public service. Our operations include: Community Engagement; Environmental Safety, Sustainability and Risk; Facilities Management; Finance (which includes Business Services, Student Financial Services and Cashiering, and the Comptroller); Procurement and Strategic Sourcing; Public Safety; Real Estate and University Human Resources.

Of particular interest to students are the safety and security resources offered by the Department of Public Safety, information and billing services provided by the Office of Student Financial Services and Cashiering, and campus efforts related to community engagement and sustainability.

Division of Information Technology

Phone: 301-405-1500
itsc@umd.edu

Jeffery Hollingsworth, Interim Chief Information Officer

The Division of Information Technology (DIT) is a strategic asset of the University of Maryland, College Park with the purpose of empowering students, faculty, and staff to use information technology to achieve all the university's three missions of teaching, scholarship, and full engagement in our community and the world.

We are a unit of knowledgeable and diverse staff that strives to build and maintain sound, advanced, secure and efficient information technology systems, capable of effectively serving the UMD community without barriers.

DIT proudly embraces our wide range of individual perspectives and experiences and highly values an open work environment that fosters the free exchange of ideas, mutual respect, and consideration for our differences.

Division of Student Affairs

2108 Clarence M. Mitchell Jr. Building
Phone: 301-314-8428
Fax: 301-314-9606
studentaffairs@umd.edu
www.studentaffairs.umd.edu

Linda M. Clement, Vice President

The Office of the Vice President for Student Affairs provides administrative leadership for 14 departments which oversee student life: Resident Life, Dining Services, Residential Facilities, Transportation Services, Counseling Center, Health Center, Recreation & Wellness, Career Center, Student Conduct, The Stamp, Fraternity & Sorority Life, Conferences & Visitor Services, Parent & Family Affairs, and Development.

This office serves as a point of contact for non-academic student services and concerns. In addition, the office provides support for the BETA Team, Student Success, and Omicron Delta Kappa.

Division of University Relations

3140 Samuel Riggs IV Alumni Center
301-405-4680
www.urhome.umd.edu

Jacqueline Lewis, Vice President

The Division of University Relations encompasses a variety of units whose shared mission is to advance the goals of the University by increasing resources and support, enhancing awareness and affinity, and strengthening and developing relationships with the Maryland family and the greater community. Units of this division include: Development (including school-, college- and unit-based staff, Annual Giving, Corporate and Foundation Relations, Alumni Relations, Marketing and Communications, Special Events, Donor Relations and Stewardship and the University of Maryland College Park Foundation. The *Fearless Ideas* campaign, which will be launched by University Relations in October 2017, has a goal to raise $1.5 billion in private support for University priorities such as undergraduate scholarships and faculty support. Through this endeavor, University Relations staff will encourage internal and external stakeholders to contribute toward discovering new knowledge, inspiring Maryland pride, transforming the student experience and turning imagination into innovation.

Equity Council

2411 Marie Mount Hall
301-405-6810
www.president.umd.edu/EqCo/

Roger L. Worthington, Interim Associate Provost and Chief Diversity Officer

The Equity Council serves as an advisory group to the President and supports the longstanding and continuous goal of the University of Maryland to be a national leader in recruiting and retaining a diverse community of faculty, staff and students. The council provides leadership in the articulation and development of affirmative action policies and procedures for the campus community. A particular focus of the Equity Council is to review and recommend, as appropriate, search and selection policies and procedures for the university and its colleges and departments. The Council consists of equity administrators from each Vice President and Dean's office and the Office of the President. The Chief Diversity Officer serves as Chair of the Council.

The current list of equity administrators at the university can be found at the Equity Council website: www.president.umd.edu/EqCo/.

Office of Diversity and Inclusion

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Fax: 301-314-9992
diverseterps@umd.edu
www.diversity.umd.edu

Roger L. Worthington, Interim Associate Provost and Chief Diversity Officer

The Office of Diversity & Inclusion (ODI) provides active oversight, coordination, and evaluation of the University of Maryland's equity, diversity and inclusion activities; manages and tracks implementation of the Strategic Plan for Diversity; and encourages and supports the efforts of units to achieve their diversity goals. We invite you to explore our website for information about our office, its activities and programs, as well as equity and diversity initiatives on campus and beyond.

For more information about ODI please go to http://www.diversity.umd.edu/.

Office of the President

1101 Main Administration Building
Phone: 301-405-5803
Fax: 301-314-9560
president@umd.edu
www.president.umd.edu

Wallace D. Loh, President

The president is the chief executive officer of the University of Maryland. Seven vice presidents, who report directly to the president, manage different divisions of the campus administration. The Department of Intercollegiate Athletics, the Maryland Fire and Rescue Institute, and the Office of Civil Rights and Sexual Misconduct report to the Office of the President. The University Senate, a representative legislative body of the university, advises the president on academic and other matters.

Office of Undergraduate Studies

2110 Marie Mount Hall
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www.ugst.umd.edu

William Cohen, Associate Provost and Dean

Director of Administration and External Relations: Jacqueline Kautzer
Director of Development and Alumni Relations: Heidi Bruce
Associate Dean for General Education: Douglas Roberts

Associate Dean: Cynthia Kay Stevens
Assistant Deans: Eric Van Johnson, Lisa Kiely, Kathryn Robinson, Ann Smith
Director of Communications and Web Development: Mark Kuhn

Through its many programs, the Office of Undergraduate Studies serves all undergraduate students at the University and the faculty and staff that support the undergraduate mission of the campus. The Office of Undergraduate Studies is the primary division at the University of Maryland responsible for leadership and oversight of undergraduate curricular and co-curricular education.

For more information about the programs in the Office of Undergraduate Studies, please see this section of the catalog (https://academiccatalog.umd.edu/undergraduate/colleges-schools/undergraduate-studies).

The Graduate School

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7809 Regents Drive
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gradschool@umd.edu
www.gradschool.umd.edu

Steve Fetter, Associate Provost and Dean

The Graduate School, under the leadership of its Dean, establishes and oversees procedures to enact policies and serves as an advocate for excellence in all aspects of graduate education. The Graduate School, on behalf of its Dean, officially admits all students into graduate degree programs and acts as the conferring body for all graduate degrees.

More information on the Graduate School can be found in the Graduate Catalog (p. 14).

University Senate

1100 Marie Mount Hall
Phone: 301-405-5805
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senate-admin@umd.edu
www.senate.umd.edu

Reka S. Montfort, Executive Secretary and Director

The University Senate, an integral part of the University's system of shared governance, has representation from all segments of the campus community: faculty, staff, undergraduate students, and graduate students. Participation in the Senate or any of its 10 Standing Committees is an honor and a responsibility.

The full Senate meets approximately nine times a year to consider matters of concern to the institution, including academic issues, university policies, plans of organization, facilities, and the welfare of faculty, staff, and students. The Senate advises the president, the chancellor, or the Board of Regents, as appropriate. To become an undergraduate student senator, students must be elected by students in their college or school or the Office of Undergraduate Studies in centralized, online elections. Elections are held every year during the spring semester. All students are also encouraged to participate in Senate Standing Committees, such as Student Affairs and Campus Affairs. These committees draw membership from the campus community at large and cover every aspect of campus life and function. Details about the election and committee volunteer processes can be found at www.senate.umd.edu.

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